FINAL POST AUTHORIZATION CHANGE REPORT AND REVISED PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

MORGANZA TO THE GULF OF MEXICO, LOUISIANA

MAY 2013

U.S. Army
Corps of Engineers,
New Orleans District

Louisiana Coastal
Protection and
Restoration Authority
Board

Terrebonne Levee and
Conservation District

Final

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ABSTRACT

The U.S. Army Corps of Engineers – Mississippi Valley Division, New Orleans District (CEMVN) – proposes to make changes and improvements in the planning, design, construction, operation, and maintenance of the Morganza to the Gulf hurricane and storm damage risk reduction system project to prevent future disasters to the greatest extent possible. The purpose of this project is to reduce the risk of damage caused by hurricane storm surges. The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level rise, and subsidence. The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche.

Alternatives investigated are a 1% Annual Exceedance Probability (AEP) Storm Surge Risk Reduction System, which would provide risk reduction for water levels that have a 1 percent chance of occurring each year, and a 3% AEP Storm Surge Risk Reduction System, which would provide risk reduction for water levels that have a 3 percent chance of occurring each year. A sponsor-funded additional work item, which would involve deepening the Houma Navigation Canal Lock Complex to -23 feet NAVD88, is an option that could be incorporated into either the 1% or 3% AEP alternatives. The two action alternatives include programmatic elements that would be further investigated in the future and constructible elements for which this Revised Programmatic Environmental Impact Statement would serve as the required documentation under the National Environmental Policy Act. The 1% AEP alternative has been identified the plan with the greatest net benefits of the two alternatives.

The major direct impact of the project is the loss of wetlands within the project right of way. There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future compared to without project conditions. The potential impacts that would be attributable to the proposed operation of the Federal levees system (including the structures) are unknown at this time but under some scenarios, these impacts could be significant. The level of impact would be dependent on the resource looked at, how the operating plan is changed, the amount of background wetland loss due to relative sea level rise, modifications in the systems to provided navigation access, and/or any changes resulting from the project being constructed and operated by the State of Louisiana and Terrebonne Levee and Conservation District along the alignment of the proposed Federal project. Mitigation for wetland impacts would be through the restoration of eroded and subsided wetlands in the project area. The project would complement state and Federal coastal restoration projects in the area by reducing the risk of coastal erosion due to storm surges.

Comments: Please send comments or questions on this Final Revised Programmatic Environmental Impact Statement to the U.S. Army Corps of Engineers, New Orleans District, Attention: Nathan Dayan, P.O. Box 60267, New Orleans, LA 70160-0267. Telephone: (504) 862-2530; Fax (504) 862-1892. The official Closing Date before Federal Action can occur on this project would be 30 days from the date on which the Notice of Availability of this Final RPEIS appeared in the *Federal Register*. (http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR)

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1. SUMMARY

Major Conclusions and Findings

This Revised Programmatic Environmental Impact Statement (RPEIS) was prepared as a final response to the Final Morganza to the Gulf of Mexico, Louisiana; Post Authorization Change (PAC) Report dated April 2013. Because of the loss of life and damage caused by Hurricanes Katrina and Rita in 2005, the HSDRRS guidelines provide a comprehensive collection of best practices and were developed to provide redundancy, resiliency, and robustness of the interfaces between structures, materials, and members of the hurricane risk reduction system for the desired level of risk reduction. New design guidelines have been incorporated into revised project alternatives, the environmental effects of which are assessed in this Final RPEIS.

Authorization: House Resolution, Docket 2376, April 30, 1992, and WRDA 96 (PL 104-303, Sec 425) are the base documents authorizing the project. Following completion of an April 1994 Reconnaissance Report, the Energy and Water Development Appropriation Act of 1995 (PL 103-316) authorized the Morganza, Louisiana, to the Gulf of Mexico feasibility study. It directed the USACE to give particular attention to the interrelationships of the various ongoing studies in the area, and consider improvements for the Houma Navigation Canal (HNC). Section 425 of WRDA 96 (PL 104-303) required the USACE to develop a study of the HNC lock as an independent feature of the Morganza to the Gulf project. That study was completed in 1997. In 1998, Congress authorized the USACE to initiate detailed design of the multipurpose lock in the HNC. The Pre-Construction, Engineering and Design (PED) phase on the HNC Lock Complex was initiated in advance of the PED phase for the Morganza to the Gulf of Mexico, Louisiana Project. The PED Agreement for the lock was signed on January 13, 2000.

The Morganza to the Gulf Feasibility Study and Final PEIS were completed in March 2002 (http://1.usa.gov/ZVel3A). The FPEIS was filed in the Federal Register on May 3, 2002 (http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR). A Record of Decision (ROD) was not signed. Section 158 of the Energy and Water Development Appropriations Act, 2004 (PL 108-137) authorized construction on reach J1 of the levee identified as work-in-kind. In accordance with the 2002 and 2003 reports of the Chief of Engineers, the Morganza project is authorized as a feature of the Mississippi River and Tributaries (MR&T). Section 1001 of WRDA 2007 (Public Law 110-114) authorized construction for the project. To date, Congress has not appropriated any construction funds. Therefore, the project remains in Pre-Construction, Engineering and Design phase.

Purpose: The purpose of this project is to reduce the risk of damages caused by hurricanes and storms for the communities located within the levee system. The primary problem continues to be the flood risk associated with storm surge and waves, which is increasing due to wetland loss, sea level rise, and subsidence.

Project Location: The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. The project area boundary is shown in red on Figure 1-1. The levee alignment of the Updated Plan

(RP) is shown in yellow. The project area extends south to the saline marshes bordering the Gulf of Mexico.

Study Partner (Non-Federal Sponsor): The Non-Federal Sponsors for the project are the Louisiana Coastal Protection and Restoration Authority Board (CPRAB) and the Terrebonne Levee and Conservation District (TLCD).

ALTERNATIVES CONSIDERED

1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative): The 1% AEP provides risk reduction for water levels that have a 1% chance of occurring each year. The 98-mile levee system would extend from high ground along US 90 near the town of Gibson and tie into the Hwy 1 near Lockport, LA in Lafourche Parish. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Planned levee elevations range from 15 to 26.5 feet NAVD88. Toe-to-toe levee widths range from 282 feet to 725 feet. The direct impacts and wetland losses are calculated based on the Right-of-Way limits (include the levee footprint, the borrow canal and the widths of the offsets required for both levee stability and borrow pit stability) plus the extents of the proposed mitigation areas. The Right-of-Way limits and proposed mitigation areas are depicted in Appendix G. Twenty-two floodgates on navigable waterways, ranging in elevation from 17 to 33 feet (NAVD88), would be located on waterways throughout the levee system, including a lock complex on the HNC. Additionally, environmental water control structures would allow tidal exchange at 23 locations through the levee through sluice gates and box culverts.

Nine road gates would be located at the following levee/road crossings: NAFTA, Four Pointe Road, Highway 315 (DuLarge), Highway 55, Highway 56, Hwy 24, Hwy 3235, Union Pacific RR and Highway 665. Fronting protection would be provided for four pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), and Hanson Canal pump stations.

The HNC Lock Complex (Figure 1-2) would consist of a 110-foot by 800-foot lock, an adjacent 250 foot-wide sector gate, and a dam closure. The complex would tie into adjacent earthen levees to reduce the risk of storm surge traveling up the HNC. Vessel traffic would pass through the sector gate portion of the structure for the majority of conditions. However, when the sector gates are closed, the lock would be used. The complex would be constructed as part of the Morganza to the Gulf of Mexico, Louisiana project but could also be operated for environmental purposes as part of the Louisiana Coastal Area (LCA) project “Convey Freshwater to Northern Terrebonne Marshes/Multipurpose Operation of the Houma Navigation Lock.”

Several LCA projects authorized by WRDA 2007 are located within the Morganza study area, including but not limited to: (1) Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (2) Modification of Davis Pond Diversion and (3) Land Bridge between Caillou Lake and Gulf of Mexico. By letters dated August 20, 2012 and October 16, 2012, CPRAB has notified the USACE that it desires to suspend study and design on these projects. The decision of CPRAB to suspend these projects results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA.

Figure 1-1. Project Area and Levee Alignment of the Tentatively Selected Plan

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants
Figure: 1-1
Date: June 2012
Scale: 1:384,000
Source: USDA/GEC
Map ID: 273160010-2811

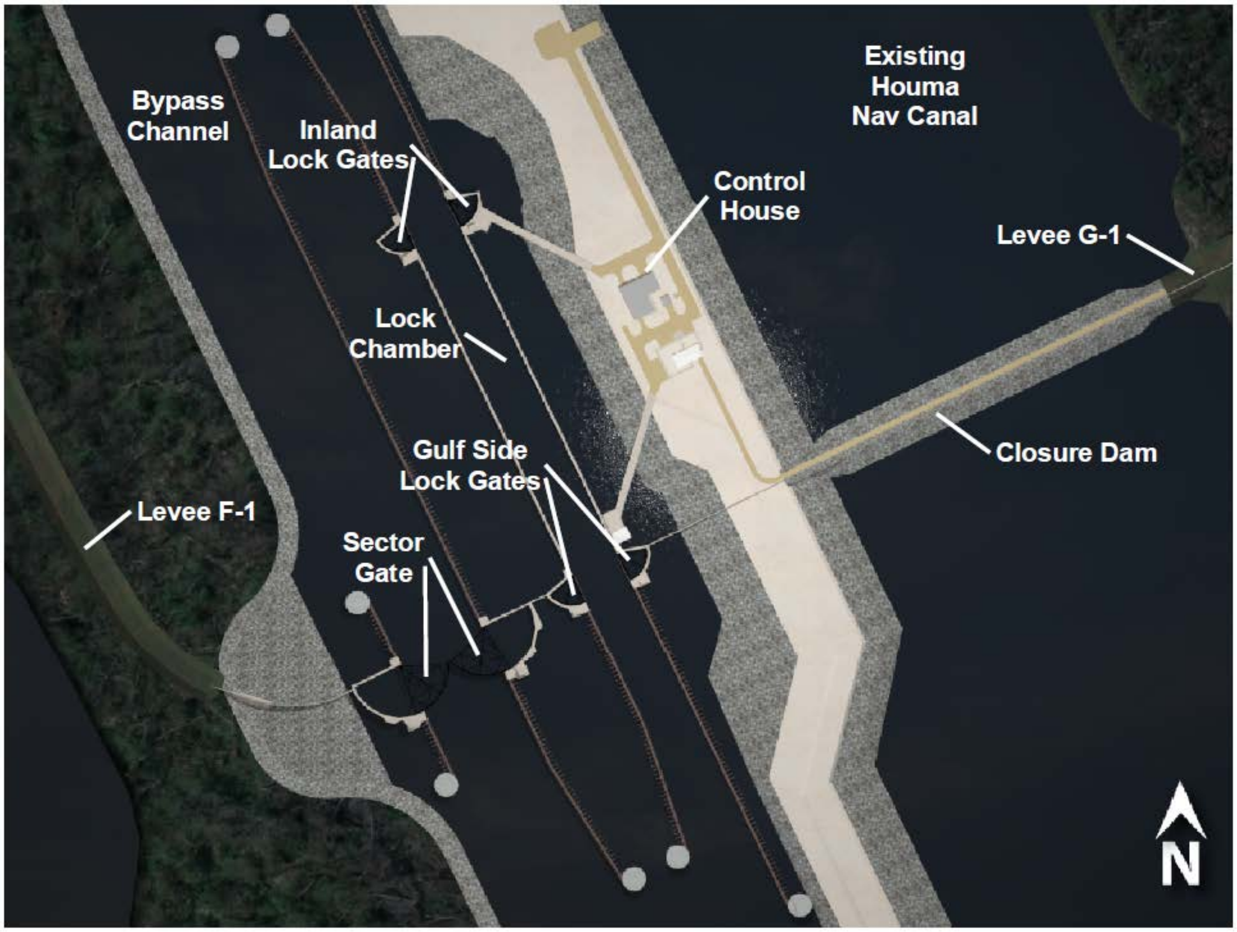

Figure 1-2. Houma Navigation Canal Lock Complex

<u>3% Annual Exceedance Probability Storm Surge Risk Reduction System (3% AEP Alternative):</u> The 3% AEP Alternative would provide risk reduction for water levels that have a 3 percent chance of occurring each year. This alternative would have nearly the same alignment and structures as the 1% AEP Alternative but with levees and structures at lower elevations to meet post-Katrina 3 percent standards. The levee alignment would extend 98 miles. Planned levee elevations range from 12.0 to 20.0 feet NAVD88. Toe-to-toe levee widths range from 174 feet to 440 feet. Structures would range from elevations of 14.0 to 25.0 feet NAVD88.

A sponsor-funded additional work item, which is considered an optional feature of both alternatives, would involve deepening the HNC Lock Complex to -23 feet NAVD88. This plan would be implemented in anticipation of a proposal to deepen the HNC, which is the subject of an ongoing feasibility analysis currently being completed by LADOTD. Implementation of the sponsor-funded additional work item would alleviate the necessity of reconstructing the HNC Lock Complex should the HNC deepening project eventually be authorized and funded. Because of the present uncertainty as to the canal deepening, the environmental impacts of the HNC deepening project would be assessed in a separate National Environmental Policy Act (NEPA) document.

RATIONALE FOR DESIGNATION OF THE PROPOSED PLAN

The 1% AEP Alternative is the Proposed Plan for the following reasons:

- Higher net benefits. According to WRDA Implementation guidance dated May 25, 2011, "recommendations in the PAC report should be made in consideration of maximizing excess benefits over costs." Both plans have positive benefit-cost ratios, but net benefits (excess benefits over costs) for the 1% AEP alternative plan are higher than the net benefits of the 3% AEP alternative plan.
- Lower residual risk. The 3% AEP alternative has a higher probability of overtopping and/or levee breaches than the 1% AEP alternative and therefore has higher residual damages than the 1% AEP alternative. For more information on residual risk and buying down that risk see the Section 10.2 of the PAC report.
- More adaptable. The 1% AEP structures would be constructed at higher elevations than the 3% AEP structures, which allows more flexibility to adapt to relative sea level rise in the future. Although the total cost of the 1% AEP alternative is significantly higher than the 3% AEP alternative, not all funding and expenditures are required up front since earthen levees would be constructed in multiple lifts.

CONSTRUCTION

Levees would be constructed using a combination of sidecast and hauled-in borrow materials. Adjacent sidecast was planned for the pre-load section only (3% and 1% alternatives). Haul in scenarios were planned for the initial (1st) lift and projected subsequent lifts for the 3% and 1% alternatives. Borrow pits are oversized to offset the potential for encountering organics, expected losses, etc. The 1% alternative would involve constructing 22 floodgates on navigable waterways, 23 environmental water control structures, nine road gates, and fronting protection for four existing pumping stations. Structures on federally maintained navigation channels include the HNC Lock Complex (110-foot by 800-foot lock, an adjacent 250 foot-wide sector gate, with sluice gates and a dam closure) and two 125-ft sector gates with sluice gates on the GIWW east and west of Houma. In addition, thirteen 56-ft sector gates and five 20- to 30-ft stop log gates are located on various waterways that cross the levee system.

Operation and maintenance of the Morganza to the Gulf project would require the Terrebonne and Lafourche levee districts to expand their current operation and maintenance programs of local levees and other flood control features. The completed project would require mowing approximately 98 miles of earthen levees and dewatering and refurbishing numerous sector gate structures every 10 to 15 years. The HNC Lock Complex and the Gulf Intracoastal Waterway floodgate, features that provide for inland waterway transportation, are a Federal responsibility.

REAL ESTATE ACQUISITION

The Non-Federal Sponsor has been found to have the legal and financial capability for performing acquisition of the Lands, Easements, and Rights-of-Way (LER) required for the project. The Non-Federal Sponsor would comply with all legal requirements regarding rights-of-way. An Assessment of the Non-Federal Sponsor's Real Estate Acquisition Capability is included in the Real Estate Plan.

SECTION 404 FINDINGS

The project features of the 1% Alternative have been evaluated with respect to Section 404(b)(1) Guidelines for Specifications of Disposal Sites for Dredged or Fill Material, published by the U. S. Environmental Protection Agency. These evaluations are included in Appendix C. The potential for environmental impact of each disposal activity was estimated on the basis of currently available engineering design data and the pertinent physical, chemical, and biological information that have been compiled as a result of this and other studies.

No particular violations of applicable State of Louisiana water quality standards, other than increased turbidity during construction operations would be expected. Construction methods would be employed to minimize the potential of violating the Toxic Effluent Standards of Section 307 of the Clean Water Act. None of the proposed plans would harm any threatened or endangered species or their critical habitat.

It is expected that the proposed material discharges would not cause or contribute to significant adverse effects on human health; the life stages of organisms within the aquatic ecosystem; or ecosystem diversity, productivity, and stability. No significant adverse impacts were identified on recreational, aesthetic, or economic values.

FINDINGS ON EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT

Executive Order 11988 directs all Federal agencies to avoid, if possible, development and other activities in the 100-year base floodplain. Federal agencies are required to:

- Reduce the risk of flood loss
- Minimize the impact of floods on human safety, health, and welfare
- Restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility.

The 1% Alternative would directly support a reduction in hazards and risks associated with flooding and would minimize the impact of floods on human safety, health, and welfare. The project would support the restoration and preservation of the natural and beneficial values of the base floodplain. The study is in compliance with Executive Order 11988.

FINDINGS ON EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

One of the major considerations for this project was to maintain long-range productivity of coastal wetlands. Although efforts were made to minimize impacts to wetlands, there were no practical alternatives to locating some project features in wetlands. Adverse impacts to wetlands and efforts to mitigate wetland losses are discussed in Section 6. The selected plan is responsive to the planning objectives established for the study and is consistent with the requirements of Executive Order 11990.

FINDINGS ON EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE IN MINORITY AND LOW-INCOME POPULATIONS

Minority and/or low-income population groups residing or working near the construction site itself may experience direct, temporary impacts due to the added traffic congestion and construction noise and dust. The impact, however, would be temporary, lasting only as long as the construction and all residents are expected to be similarly impacted. The proposed project alignment would increase protection from hurricane and storm damages for minority and/or low-income populations in the project area. Regional economic growth resulting from the proposed action may create additional jobs, thereby benefitting minority and/or low-income groups living within the project area. Approximately 32% of the residents living in the 73 census blocks within 0.25 miles of the proposed alignment are minority. Approximately 28% of the residents of the reference study areas of Lafourche and Terrebonne Parishes are minority. Construction activities associated with the alignment will not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of E.O. 12898.

The community of Dulac is bisected by the constructible features of the proposed alignment. The constructible feature cuts through one census block in Dulac which is comprised of a minority population of 56%. The constructible features would not result in induced flooding to the community of Dulac or other communities located outside of the proposed levee alignment. Additional outreach and discussions with the community will be conducted during Planning, Engineering, and Design.

Construction of the project has the potential to raise water levels in several communities located outside the levees by several feet during storm events. Present day surges of 7 to 10 ft could increase by as much as 3 to 7 ft more than the sea level rise increase in the future. For more information on future without project conditions regarding storm surge and sea level rise, see Section 3 of the Post Authorization Change (PAC) study. These include portions of the communities of Gibson, Bayou Dularge, Dulac, and all of Isle de Jean Charles and Cocodrie. The USACE, for purposes of this report, has assumed the worst-case compensation scenario, a 100% buy-out and uniform relocation assistance for residents outside of the project alignment. Should this scenario prove to be the appropriate mitigation method, at least 2,500 people would need to be relocated to areas behind the Federal protection system. For more information regarding the buyout and uniform relocation assistance please refer to the Real Estate Plan.

This study complies with the requirements of Executive Order 12989. As this is a Programmatic Environmental Impact Statement, additional analysis and outreach to identified EJ communities would be conducted during Planning, Engineering, and Design and documented in supplemental NEPA reports in order to minimize any potential disproportionate impacts.

FINDINGS ON EXECUTIVE ORDER 13112, INVASIVE SPECIES

The 1% Alternative involves creating borrow canals to obtain material for the construction of levees and other upland structures. Uplands of this nature are susceptible to such invasive species as Chinese tallow tree. Borrow canals can contribute to the spread of invasive aquatic plants such as water hyacinth and giant salvinia, both of which are problematic in southern Louisiana. Maintenance activities, which would be provided by the Non-Federal Sponsor, are considered necessary to control the establishment of invasive species. This project is in compliance with Executive Order 13112.

FINDINGS ON ER 1165-2-132, HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

Consistent with ER 1165-2-132, an HTRW investigation of the project area was conducted. The investigation identified existing or potential recognized environmental conditions (RECs) in and near the project area, but it is unlikely that HTRW would alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large. However, a waiver may be needed to allow work in and acquisition of real estate interests with HTRW issues. If the project location or methods change, an additional HTRW investigation may be needed. Should HTRW concerns arise at anytime during the project, CEMVN would coordinate with the appropriate Federal and state authorities to implement an approved response action, the removal of HTRW being a responsibility of the Non-Federal Sponsor by virtue of the Project Partnership Agreement (PPA).

FINDINGS ON OTHER SIGNIFICANT RESOURCES OF THE PROJECT AREA

Fisheries Resources: Direct impacts could result from the construction of levees, water control structures from the 1% Alternative. There is a potential for adverse indirect and cumulative impacts would occur on fishery resources due to changes in fishery access, salinity, turbidity, and submerged aquatic vegetation (SAV). The mitigation planned would offset the loss of aquatic habitats.

Water Quality: Other than temporary and localized effects associated with construction, no direct adverse effects are anticipated with respect to water and sediment quality. There is a potential for adverse indirect and cumulative impacts water quality inside the levee system quality due to increased frequency and duration of water control structure closures in the future.

Threatened and Endangered Species: No direct impacts on protected species are anticipated from the action alternatives.

AREAS OF CONTROVERSY

Significant areas of controversy have been identified during the planning phase of this project. Members of the scientific community have stated their preference for a multiple lines of defense alternative rather than the proposed levee alignment. The public, natural resource agencies, and organizations have raised concerns related to adverse impacts to wetlands due to the construction of project levees as well as the potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future compared to without project conditions which under some scenarios could be significant.

UNRESOLVED ISSUES

Borrow Locations: Borrow costs are by far the largest component of this project. Borrow material for first lift levees is primarily obtained adjacent to the levees. Constructible feature borrow sites have been identified; however, for future lifts, it is assumed that borrow material would come from yet to be identified government-furnished borrow areas. The current status of unknown supply locations may be a concern to project reviewers/approvers. The current estimate of a 25-mile one-way haul distance appears to be very conservative and covers the worst case. The non-Federal sponsor strongly believes that private landowners are ready, willing, and able to supply suitable borrow material for this project.

Sponsor-Funded Additional Work Item: Significant coordination with the resource agencies has been undertaken on both the 1% AEP alternative and the sponsor-funded additional work item. No issues have been raised at this stage in the planning process that would preclude implementation of either project. Considering the uncertainties associated with the future depth of the HNC, the benefits of building a more adaptable lock complex are significant for the Nation. The CPRAB would assume all incremental costs and incremental Operations, Maintenance, Replacement, Repair and Rehabilitation (OMRR&R) of the sponsor-funded additional work item. The overall benefits of implementing the sponsor-funded additional work item outweigh the additional costs that result from the deeper sill depth. Thus, the New Orleans District requests approval to recommend the -23 ft NAVD88 sill elevation as a sponsor-funded additional work item.

Inducements on Larose to Golden Meadow Project: The future-without condition for the Larose to Golden Meadow levee system is uncertain since the Larose PAC analysis is ongoing and future levee elevations for the existing Larose ring levee system have not yet been determined. If the Morganza project is re-authorized to the 1% AEP level of risk reduction, but the Larose project is (a) not re-authorized; (b) re-authorized to less than a 2% AEP level of risk reduction; or (c) is authorized but not supported by a financially capable Non-Federal Sponsor willing to execute a PPA, the Morganza project would have added costs to both offset induced stages on the existing Larose system and to complete the Morganza system to ensure no overtopping of the Larose C-North levees that could impact the Morganza risk reduction area. Therefore, the Morganza to the Gulf PAC analysis assumes no further upgrades to the Larose to Golden Meadow system to ensure that all potential costs to complete the Morganza system are considered.

Inducements on Areas Outside of Levees: Construction of the project has the potential to raise water levels immediately outside the levees by several feet during storm events. Present day surges of 7 to 10 ft could increase by as much as 3 to 7 ft more than the sea level rise increase in the future. For more information on future without project conditions regarding storm surge and sea level rise, see Section 3 of the Post Authorization Change (PAC) study. These areas include portions of the communities of Gibson, Bayou Du Large, Dulac, Cocodrie, and Isle de Jean Charles. At the current time, information is not available on the specific details on the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. Because of the vast scope of this project and the limited amount of available information at this time, the USACE did not look at each affected parcel individually in order to determine potential impacts to property rights from the proposed Federal action that may give rise to compensation. For example, without more information, it is impossible to rule out the possibility of additional takings for all of the structures in these communities.

Due to this concern, the USACE has assumed the worst case compensation scenario (most expensive option): a 100 percent buy-out of all of the structures in the impacted areas. The total cost for this plan is estimated to be $305,115,300. This cost and associated benefits with this compensation option have been incorporated into the 1% Alternative. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents.

HNC Lock Complex Operation Plan: The HNC lock complex would be constructed and operated as part of the Morganza to the Gulf project to reduce the risk of flooding due to storm surge and limit saltwater intrusion, but could also be operated for environmental purposes as part of the LCA Convey Freshwater to Northern Terrebonne Marshes/Multipurpose Operation of the Houma Navigation Lock project. For the multipurpose operation to occur, the LCA project would have to develop an OMRR&R plan that goes above and beyond the plan developed for the Morganza to the Gulf project. By letters dated August 20, 2012 and October 16, 2012 the State of Louisiana formally notified the USACE of the State’s path forward for the LCA Program. The HNC Lock Complex that provide for inland waterway transportation, are a Federal responsibility for OMRR&R. Any changes to the operation plan would have to be coordinated with US Army Corps of Engineers and potentially require a supplemental NEPA document. Impacts and benefits for the multipurpose operation would need to be described in detail in a future NEPA document.

RELATIONSHIP OF PLANS TO ENVIRONMENTAL REQUIREMENTS

Table 1-1 shows in tabular format the relationship of plans to environmental protection statutes

Table 1-1. Relationship of Plans to Environmental Protection Statutes or Other Environmental Requirements

FEDERAL STATUTES	1% AEP	3% AEP
1. Archaeological and Historic Preservation Act of 1974. **Compliance requires USACE to undertake recovery, protection, and preservation of significant cultural resources whenever its activities may cause irreparable loss or destruction of such resources.**	FC	FC
2. Clean Air Act of 1970, as Amended. **Compliance requires coordination with the U.S. Environmental Protection Agency and analysis of potential impacts on air quality.**	FC	FC
3. Clean Water Act of 1977. **Compliance requires preparation of 404(b)(1) Evaluation and submission of such to Congress. The 404(b)(1) Evaluation is located in Appendix C.**	FC	FC
4. Endangered Species Act of 1973, as Amended. **Compliance requires coordination with the U.S. Fish and Wildlife Service (USFWS) to determine if any endangered or threatened species or their critical habitat would be impacted by the project.**	FC	FC
5. Federal Water Project Recreation Act. **Compliance requires review by the Department of the Interior.**	FC	FC
6. Fish and Wildlife Coordination Act. **Compliance requires coordination with the USFWS. A Final Fish and Wildlife Coordination Act Report is included in Appendix B.**	FC	FC
7. Land and Water Conservation Fund Act. **Compliance requires Secretary of the Interior approval of replacement property that would be acquired to mitigate converted property purchased with LWCFA funds.**	PC	PC
8. National Historic Preservation Act. **Compliance requires USACE to take into account the impacts of project on any property included in or eligible for inclusion in the National Register of Historic Places.**	FC	FC
9. National Environmental Policy Act. **Compliance requires preparation of this draft EIS, consideration of public comments, and preparation and public review of the final EIS. Signing of the Record of Decision would bring this project into full compliance.**	FC	FC
10. River and Harbor Act. **No requirements for USACE projects authorized by Congress.**	NA	NA
11. Farmland Protection Policy Act. **Compliance requires coordination with the Natural Resources Conservation Service to determine if any designated prime or unique farmlands are affected by the project.**	FC	FC
12. Watershed Protection and Flood Prevention Act. **No requirements for USACE projects.**	NA	NA

13. Wild and Scenic River Act. Compliance requires coordination with Department of the Interior to determine if any designated or potential wild, scenic, or recreational rivers are affected by the project. Coordination has been accomplished and there are no such rivers in the project area.	NA	NA
14. Coastal Zone Management Act of 1972. Compliance requires consistency determination for Department of Natural Resources that the project is consistent with the state Coastal Zone Management Program.	FC	FC
15. Magnuson-Stevens Fishery Conservation and Management Act of 1976. Compliance requires coordination with the National Oceanic and Atmospheric Administration (NOAA) on essential fish habitat (EFH) to determine if EFH would be affected by the project	FC	FC
EXECUTIVE ORDER/MEMORANDA	1% AEP	3% AEP
1. Executive Order 11988, Floodplain Management. Compliance requires an assessment and evaluation together with the other general implementation procedures to be incorporated into the EIS.	FC	FC
2. Executive Order 11990, Protection of Wetlands. Compliance requires results of analysis and findings related to wetlands be incorporated into GRR and EIS.	FC	FC
3. Executive Memorandum, Analysis of Impacts on Prime and Unique Farmlands in EIS. Compliance requires inclusion of effects of proposed action on prime and unique farmlands in EIS.	FC	FC
4. Executive Order 11593, Protection and Enhancement of the Cultural Environment. Compliance requires USACE to administer cultural properties under their control in stewardship for future generations; preserve, restore or maintain such for benefit of the people; and assure that its plans contribute to preservation and enhancement of non-federally owned sites.	FC	FC
5. Executive Order 13112, Invasive Species. Compliance requires assessment of potential for the project to introduce invasive species to the project area.	FC	FC
6. Executive Order 12898, Environmental Justice in Minority and Low-income Populations. Compliance requires assessment of project effects on minority and low-income populations.	FC	FC
FC - In Full Compliance PC - In Partial Compliance NA - Not Applicable		

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3. NEED FOR AND OBJECTIVES OF ACTIONS

3.1 Introduction

The U.S. Army Corps of Engineers (USACE), New Orleans District (CEMVN), is preparing a Revised Programmatic Environmental Impact Statement (RPEIS) to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. This RPEIS is a revision to the 2002 Final Programmatic EIS for the project. The 2002 RPEIS was not finalized with the signing of a Record of Decision. A revision is required because project alternatives have been modified as a result of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. The project area boundary is shown in red on Figure 3-1. The proposed levee alignment is shown in yellow. The project area extends south to the saline marshes bordering the Gulf of Mexico.

The 1% AEP Alternative would include the construction of 98 miles of levees, approximately 84 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

In addition to the No Action (future-without-project) Alternative, two levee-design alternatives that share the same alignment but vary in width and height are being evaluated: the 1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP), which would provide risk reduction for water levels that have a 1 percent chance of occurring each year, and the 3% Annual Exceedance Probability Storm Surge Risk Reduction System (3% AEP), which would provide risk reduction for water levels that have a 3 percent chance of occurring each year. This RPEIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality's Regulations (40 Code of Federal Regulations (CFR) parts 1500-1508), and the USACE Procedures for Implementing NEPA (33 CFR, part 230).

3.2 Background

The Morganza, Louisiana, to the Gulf of Mexico (Morganza to the Gulf) Reconnaissance Study was authorized by a resolution adopted April 30, 1992, by the Committee on Public Works and Transportation of the U.S. House of Representatives. The Energy and Water Development

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Figure 3-1. Project Area and Levee Alignment of the Tentatively Selected Plan

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 3-1
Date: June 2012
Scale: 1:384,000
Source: USDA/GEC
Map ID: 273160010-2811

Appropriation Act of 1995 (Public Law (PL) 103-316) then authorized the Morganza to the Gulf Feasibility Study. A Final Programmatic Environmental Impact Statement (FPEIS) for the Morganza to the Gulf Feasibility Study (USACE 2002) (http://www.mvn.usace.army.mil) was filed in the *Federal Register* on May 3, 2002 (http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR). The project was authorized in the Water Resources Development Act (WRDA) of 2007.

Designs for the final alternatives analyzed in the 2002 Morganza to the Gulf Feasibility Study and FPEIS were developed well before Hurricane Katrina's devastating impact on the hurricane protection levees in New Orleans in August, 2005. The authorized MR&T project, Morganza to the Gulf of Mexico, was intended to function as a 1% AEP hurricane and storm damage reduction system. As part of updating the 2002 Feasibility Study, the CEMVN design team was tasked with updating alternatives to incorporate new, more robust hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita, both of which struck south Louisiana in 2005.

The cost to incorporate the new criteria into the Morganza to the Gulf project would exceed the authorized project cost by more than 20 percent, thereby exceeding the Section 902 Limit (WRDA 1986) and triggering the need for reauthorization from Congress. A Post Authorization Change (PAC) report is currently being developed to address the cost and impacts of incorporating these new criteria and to seek reauthorization. A Record of Decision for the 2002 Morganza to the Gulf FPEIS has not been signed due to these changes.

The PAC report was initiated in November 2008 and was completed in 2013. The PAC report would develop feasibility-level designs and costs for both alternatives and evaluate and select as the proposed plan the alternative with the greatest net benefits.

This RPEIS was being prepared for concurrent submittal with the PAC report. The RPEIS documents the changes in existing conditions and evaluates all direct, indirect, and cumulative environmental impacts of increased levee footprints and new levee alignments resulting from the incorporation of post-Katrina design criteria. Although programmatic in nature, this RPEIS has sufficient details and impact analyses for some features so that construction can proceed on those features. The features that are expected to be identified as constructible include:

- Levee Reach F1 and F2
- Levee Reach G1
- HNC Lock Complex
- Bayou Grand Caillou Floodgate

These four features are discussed in Section 4, *Alternatives*; figures showing the locations of these features may be found in Appendix G, *Mapbook*, and in Section 4.

3.3 Non-Federal Sponsors

The Louisiana Coastal Protection and Restoration Authority Board (CPRAB) and the Terrebonne Levee and Conservation District (TLCD) intend to be the non-Federal co-sponsors for the

Morganza to the Gulf project (hereafter referred to as the non-Federal sponsor). In a letter dated 21 December 2012, the CPRAB and TLCD expressed their commitment and understanding of non-Federal cost share responsibilities for construction and operation and maintenance, repair, replacement and rehabilitation (OMRR&R). Section 1001(24) of WRDA 2007 specifies Federal responsibility for OMRR&R of the HNC Lock Complex and the GIWW floodgate features that provide for inland waterway transportation in accordance with Section 102 of WRDA 1986, as amended. The non-Federal sponsor is responsible for OMRR&R of all other project features. Additional responsibilities of the non-Federal sponsor are listed in the PAC report. Agencies that assisted through participation as members of the Habitat Evaluation Team (HET) included the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS), Louisiana Department of Wildlife and Fisheries (LDWF), and the Louisiana Department of Natural Resources (LDNR). Other agencies that assisted in the project included the U.S. Geological Survey (USGS), Natural Resources Conservation Service (NRCS), Louisiana Department of Transportation and Development (DOTD), the South Lafourche Levee District, and the Terrebonne Levee and Conservation District.

3.4 Project Authority

3.4.1 AUTHORIZATIONS FOR STUDIES AND CHIEF'S REPORTS

House Resolution, Docket 2376, April 30, 1992; and WRDA 96 (PL 104-303, Sec 425) are the base documents authorizing the project. The 1992 resolution, adopted by the Committee on Public Works and Transportation of the U.S. House of Representatives, states:

> *Resolved by the Committee on Public Works and Transportation of the United States House of Representatives, that the Board of Engineers for Rivers and Harbors, is requested to review the report of the Chief of Engineers on the Mississippi River and Tributaries (MR&T) Project, published as House Document 308, Eighty-eighty Congress, Second Session, and other pertinent reports, to determine whether modifications of the recommendations contained therein are advisable at the present time in the interest of flood control, navigation, wetlands conservation and restoration, wildlife habitat, commercial and recreational fishing, salt water intrusion and fresh water and sediment diversion, and other purposes in the area between the East Atchafalaya Protection Levee and the Mississippi River/Bayou Lafourche System, from Morganza, Louisiana, to the Gulf of Mexico.*

Following completion of the April 1994 Reconnaissance Report, the Energy and Water Development Appropriation Act of 1995 (PL 103-316) authorized the Morganza, Louisiana, to the Gulf of Mexico feasibility study. It directed the USACE to give particular attention to the interrelationships of the various ongoing studies in the area, and consider improvements for the HNC.

> *The Committee is aware that the Corps of Engineers is proceeding with several studies and projects that impact the coastal area of Louisiana, including the Morganza, La to the Gulf of Mexico feasibility study, the Lower Atchafalaya*

> *Basin reevaluation study, and several projects being pursued under the Coastal Wetlands Planning, Protection, and Restoration Act. The Committee is concerned that these studies and projects are proceeding concurrently, yet independently, and requests that the Corps gives particular attention to the interrelationship of these studies and projects during the imperative and direct involvement of the various local interests during the process. The Committee also directs that the Morganza, La to the Gulf of Mexico study include consideration of improvement at and/or within the Houma Navigation Canal.*

Section 425 of WRDA 96 (PL 104-303) required the USACE to develop a study of the HNC lock as an independent feature of the Morganza to the Gulf project.

> *(1) IN GENERAL.—The Secretary shall conduct a study of the environmental, flood control, and navigational impacts associated with the construction of a lock structure in the Houma Navigation Canal as an independent feature of the overall flood damage prevention study being conducted under the Morganza, Louisiana, to the Gulf of Mexico feasibility study.*
> *(2) CONSIDERATIONS.—In conducting the study under paragraph (1), the Secretary shall—*
> *(A) consult with the South Terrebonne Tidewater Management and Conservation District and consider the District's Preliminary Design Document dated February 1994; and (B) evaluate the findings of the Louisiana Coastal Wetlands Conservation and Restoration Task Force, established under the Coastal Wetlands Planning, Protection and Restoration Act (16 U.S.C. 3951 et seq.), relating to the lock structure. (b) REPORT.—Not later than 6 months after the date of the enactment of this Act, the Secretary shall transmit to Congress a report on the results of the study conducted under subsection (a), together with recommendations for immediate implementation of the study.*

That study was completed in 1997. In 1998, Congress authorized the USACE to initiate detailed design of the multipurpose lock in the HNC. The Pre-Construction, Engineering and Design (PED) phase on the HNC lock complex was initiated in advance of the PED phase for the Morganza to the Gulf of Mexico, Louisiana Project. The PED Agreement for the lock was signed on January 13, 2000.

The Morganza to the Gulf Feasibility Study and Final PEIS were completed in March, 2002 (http://1.usa.gov/ZVel3A). The FPEIS was filed in the Federal Register on May 3, 2002. A Record of Decision (ROD) has not been signed as of this date. Federal projects aimed at managing the nation's water resources typically receive congressional authorization through the WRDA. In accordance with the 2002 and 2003 reports of the Chief of Engineers, the Morganza project is authorized as a feature of the Mississippi River and Tributaries (MR&T). Historically, Congress has considered WRDA legislation approximately every other year. However, after the 2000 WRDA bill, Congress did not pass any new WRDA legislation until 2007. Thus, the Morganza to the Gulf project was not authorized until the WRDA of 2007. The authorized MR&T project, Morganza to the Gulf of Mexico, was intended to function as a 1% AEP hurricane and storm damage reduction system.

3.4.2 AUTHORIZATIONS FOR CONSTRUCTION INCLUDING IN-KIND CREDIT

Section 158 of the Energy and Water Development Appropriations Act, 2004 (PL 108-137) authorized construction on reach J1 of the levee identified as work-in-kind, and further states that:

> *The Secretary may carry out the Reach J, Segment 1, element of the project for hurricane and storm damage reduction, Morganza to the Gulf of Mexico, Louisiana, in accordance with the report of the Chief of Engineers, dated August 23, 2002, and supplemental report dated July 22, 2003 at a total cost of $4,000,000.*

Section 1001 of WRDA 2007 (Public Law 110-114) authorized construction for the project:

> *. . .for hurricane and storm damage reduction, Morganza to the Gulf of Mexico, Louisiana: Reports of the Chief of Engineers dated August 23, 2002, and July 22, 2003, at a total cost of $886,700,000, with an estimated Federal cost of $576,355,000 and an estimated non-Federal cost of $310,345,000. The operation, maintenance, repair, rehabilitation, and replacement of the Houma Navigation Canal lock complex and the Gulf Intracoastal Waterway floodgate features of the project described in subparagraph (A) that provide for inland waterway transportation shall be a Federal responsibility in accordance with section 102 of the Water Resources Development Act of 1986 (33 U.S.C. 2212).*

3.5 Design Guidelines and Regulation Changes Since Authorization

New design guidelines and regulations pertaining to risk analyses and relative sea level rise scenarios have been issued since the 2002 feasibility study. These changes are incorporated into the current design and evaluation of alternatives.

3.5.1 DESIGN GUIDELINES

Hurricanes Katrina and Rita caused tremendous loss of life and destruction of property when they struck coastal Louisiana in 2005. The HSDRRS guidelines provide a comprehensive collection of best practices and were developed to provide redundancy, resiliency, and robustness of the interfaces between structures, materials, and members of the hurricane risk reduction system for the desired level of risk reduction. New design guidelines have been developed and are outlined in the *US Army Corps of Engineers, New Orleans District Engineering Division, Hurricane and Storm Damage Risk Reduction System Design Guidelines, New Orleans District Engineering Division, February 2011*. The design guidelines have been incorporated into the current project alternatives. More information on the current design guidelines and criteria is provided in the engineering appendix of the PAC report.

3.5.2 DATUM

The primary datum used throughout the study is the North American Vertical Datum of 1988 (NAVD88). If figures or tables have a different datum, it would be clearly stated.

3.5.3 RISK AND UNCERTAINTY

Risk and uncertainty are intrinsic in water resources planning and design. USACE Engineering Regulation (ER) 1105-2-101, dated January 3, 2006, provides guidance on the evaluation framework to be used in USACE flood damage reduction studies. The risk analysis approach for the current alternatives is documented in the PAC report.

In a coastal environment, flood risk can be caused by a combination of hurricane surge, waves, wave overtopping of structures, riverine flooding due to rainfall and/or snowmelt, or other sources. For the Morganza to the Gulf project, the dominant source of flood risk is from hurricane storm surge. For the PAC report, risk has therefore been defined as "the probability an area would be flooded by storm surge, resulting in undesirable consequences."

The current action alternatives include identical levee alignments and structural features. The only difference between them lies in the levee dimensions and structure heights related to two differing levels of hurricane risk reduction as per the February 2011 *Hurricane and Storm Damage Reduction System Design Guidelines*: the 1% and 3% AEP alternatives.

The 1% AEP Alternative is designed to withstand a storm surge that has a 1 percent chance of occurring each year. The levee designed for this system is sometimes referred to as a "100-year levee." The 3% AEP Alternative is designed to withstand a storm surge that has a 3 percent chance of occurring each year. This is sometimes referred to as a "35-year levee." Although a storm surge that has only a 1 percent or 3 percent chance of occurring each year (annual chance surge) seems unlikely, over the course of 30 years, the probability that a 1-percent-annual-chance surge would occur increases to 26 percent. Table 3-1 compares the long-term risks for the final array of alternatives.

Table 3-1. Annual Exceedance Probability and Long-Term Risk

Alternative	**Annual Exceedance Probability**	**Long-Term Risk (Chances of Exceedance Over Indicated Time Period)**				
		10 Years	**30 Years**	**50 Years**	**70 Years**	**100 Years**
No Action	1 in 10 or 0.10 or 10%	65%	96%	99%	100%	100%
1% AEP Alternative	1 in 100 or 0.01 or 1%	10%	26%	39%	51%	63%
3% AEP Alternative	1 in 35 or 0.03 or 3%	25%	58%	77%	87%	94%

Discussion of Model Uncertainties

It is extremely challenging to assign an uncertainty to numerical model results due to the numerous sources of error present in the model development and implementation. These sources of uncertainty include but are not limited to:

1. Tidal Boundary Conditions
2. Freshwater Inflows
3. Initial Salinity Conditions
4. Gulf Salinity Specification at the Tidal Boundary
5. Wind Specification
6. Rainfall
7. Supplemental Tidal Storage from Wetlands not Included in the Model Domain
8. Bathymetry
9. Utilization of a Depth Averaged Model (Assumes Complete Vertical Mixing)
10. Limited Salinity Data for Initial Conditions Specification and Model Verification

Due to these numerous sources of uncertainty, the numerical model may not precisely match extreme high and low observed water levels and/or salinities. As can be observed from the listed sources of uncertainty, precise matching of the field data is unlikely and therefore predictions of absolute salinity fields associated with system alterations (plans) would have large associated uncertainties as well.

The majority of the uncertainties presented are associated with the specification of the boundary conditions for the numerical model. Comparison of base versus plans or difference comparisons greatly reduces the impacts of the uncertainties associated with the boundary conditions specification. By utilizing base versus plan comparisons over absolute salinity fields, the resulting comparisons should be significantly more accurate due to the reduction/elimination of errors associated with the boundary conditions specification.

The magnitude of the uncertainty associated with absolute salinity values can be inferred using the root mean square errors (RMSE) for the individual gage locations provided in the Validation of the Morganza to the Gulf of Mexico TABS-MDS Numerical Model." The RMSE is the average uncertainty in the model results when compared to the field data. Therefore a RMSE error value of 1 would indicate that on average the model results would be within plus or minus 1 of the field value. Due to the complex nature of the system, these RMSE values cannot be interpolate to other portions of the mesh and therefore should only be considered as indications of the uncertainty in the model results. The RMSE values also indicate the variation in the uncertainty for various portions of the mesh. It should also be noted that the model is significantly more accurate in replicating the yearly mean salinity values instead of the values for discrete time periods (see Table 8 in the "Validation of the Morganza to the Gulf of Mexico TABS-MDS Numerical Model").

A new version of the validation report has also been provided which includes increased discussion of some of the less favorable model to data comparisons.

In the end, the primary motivation for using a numerical model to evaluate the impacts of construction projects, such as this project, is the ability to isolate and control uncertainties in the system. The value of the model lies in the ability to essentially say

IF our best estimates of the boundary forcings on the system, given all of the uncertainties above, are reasonable and within the realm of expected conditions,

THEN**,** the model can eliminate those uncertainties from our simulations and specifically address the effects of changing the physical project conditions.

Discussion of the Uncertainties in the Indirect and Cumulative Impact Analysis

There is a potential for adverse indirect and cumulative impacts to wetlands, aquatic organisms including Essentials Fish Habitat (EFH), water quality, and navigation due to increased frequency and duration of water control structure closures in the future compared to without project conditions due to RSLR. The potential impacts that would be attributable to the proposed operation of the Federal levees system (including the structures) is unknown at this time but under some SLR and levee system operations plan scenarios, these impacts could be significant. The level of impact would be dependent on the resource examined and how the operating plan is changed, the amount of background wetland loss due to RSLR, modifications in the systems affecting provided navigation access, and/or any changes resulting from the project being constructed and operated by the State of Louisiana and Terrebonne Levee and Conservation District along the alignment of the proposed Federal project.

Regular tidal fronts can deposit sediment into connected coastal wetlands. The levee system could increase the speed of coastal erosion by blocking sediments from moving through the system, but approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. The Habitat Evaluation Team (HET) discussed these assumptions and concluded that although the project would prevent some sediment deposition (a potential negative indirect effect of the project); the levees could also prevent surge and waves from destroying interior wetlands (a potential positive indirect effect). USFWS noted that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise. Since the net effect of sediment deposition impacts with the project compared to without the project (no action) is unknown and highly speculative the HET agreed that it should not been quantified for the indirect impacts analysis at this time.

Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species.

The operating plan for the system as planed is described in detail in section 4.3.8 of the FRPEIS and is the basis for the start of the indirect impact analysis. The Project Delivery Team (PDT) including the local sponsor and the HET worked together to develop this operating plan. Part of the discussion was what changes would potential occur in the operating plan due to future sea level rise that could have effect the resources inside the system differently. Some of the scenarios that were discussed included:

1. Status quo on the stage elevation triggers – The Operation Plan would not change with increasing sea level. The number and length of time that the structures with a stage elevation that is not also controlled by a National Hurricane Center (NHC) watch would increase. Lands and communities inside the system would be impacted by tidal surge less than those they would have experienced without the project in place. Due to these increase in closures there would be an increase in adverse impacts on wetland, fisheries, water, quality, and navigation compared to both with project historical SLR and without project . Conversely there would be beneficial impacts due to the reduction in flood risk to communities.

2. Status quo on the number of days of closures – The Operation Plan would change with increasing sea level. The trigger stage elevation would be required to increase so that the number of days and length of closures for non NHC watch events would be maintained. Lands (including wetlands) and communities inside the system would be impacted by tidal surge more often than those they would have with the project in place under historical sea level rates but still less than they would without the project in place. Due to this increase in flooding both the adverse and beneficial impacts discussed in scenario 1 are less than those that would be part of scenario 1 but still greater than without project impacts.

3. Leave structures open except for NHC watches – This operating plan would be the most similar to without project impacts. Of the whole alignment approximately only fourteen percent of would create new indirect impacts. The structures in the alignment have been designed to maintain the existing flows in the area and to maintain ingress and egress of aquatic species. There would be minimal impact to navigation, and water quality except during NHC watch closures compared to without project condition and no additional benefits of preventing flooding during non storm events. The functional value of wetlands would be impacted because aquatic species that were using the area before the construction of the levee could have a harder time getting to them or getting out of the system because of having to travel through the flood gates and environmental control structures. The wetlands in the area and the Houma water treatment plan would not get any benefits from salinity control; additionally wetlands would be inundated at the same rate as the without project condition.

4. Manage each structure independent of others based on local site condition. - This operation plan is impracticable to analysis for many reasons including the amount a variation that could happen.

Wetlands

The HET developed a low impact scenario and a high impact scenario related to salinity benefits and fish access to be use in the WVA process and an operation plan foreseeable future change. Figure 3- 2 shows the area considered for the indirect impact analysis of the constructible features they included study area subunits, B1- B5, C1-C10, C20, Bayou Dulac, and Robinson

Canal (figure 1 in Appendix F). Total acres of marsh and water that would be indirectly impacted by the constructible feature are 46,215 acres (3,965 FM, 16,020, IM, 12,442 BM, and 13,788 SM). WVAs were then run by USFWS (See Appendix F) using the assumption in the plans to determine the indirect impact of the constructible features. The indirect impact to an individual acre of marsh ranges from .005 to .009 impact potential (IP). Table 3- 2 displays the total AAHUs impacted (46,215 acres X IP) for the different scenario, operating plans, SLR combinations. The impacts to individual acres are quite small, but when all the acres impacted are add together the impact could be significant.

Table 3- 2: Indirect impact for Constructible Features AAHUs using Various Impact Scenario, Sea level Rise Rates, and Operating Plans

	Low Impact Scenario AAHUs		High Impact Scenario AAHUs	
	Medium RSLR	High RSLR	Medium RSLR	High RSLR
Operation Plan As IS	- 216	-287	-257	-324
Operation Plan Foreseeable Future Changes	-375	-380	-418	-414

Low RSLR was not run due to lack of salinity model results. A perfect acre has a score of 1 AAHU.

To avoid these indirect impacts to fisheries use value of wetlands the structures would have to remain open for longer periods of time to allow for fisheries ingress and egress. This would require a tradeoff on loss of benefits from the reduction in saltwater intrusion and inundation which would be one way to minimize impacts. To offset these unavoidable indirect impacts would require between 721 to 1442 acres of marsh to be created at a cost of 60 to 120 million dollars including monitoring. CEMVN's determination was to mitigate for the combination of the high impact scenario, the operating plan as is, under medium RSLR. This was determined to be a conservative approach that was not overly speculative. The details of the mitigation can be found in section 6.19 and Appendix K of the FPEIS and would create approximate 257 acres of intermediate marsh, 92 acres of brackish marsh, and 373 acres of saline marsh for a total of 722 acres on the flood side of the levees to mitigate for the indirect impacts.

Choosing the high impact scenario discounts the benefits that could be provided by controlling the salinity. Changes in wetland plant communities would result from the changes in salinity, but they are not described in detail in this document. As part of the trade off analysis that needs to occur during the PED phase a habitat change model such as the one described in Snedden, G et.al. (2013) could be conducted.

Aquatic Organisms and EFH Indirect impacts

Generally adverse indirect impact to aquatic organisms could occur by preventing them from accessing the marsh or gulf waters, reducing the water quality, shifting the salinity regime, lowering the quality of the marsh, and concentrating them which could encourage predation including overfishing. Depending on their life stage, and the species involved the intensity of the

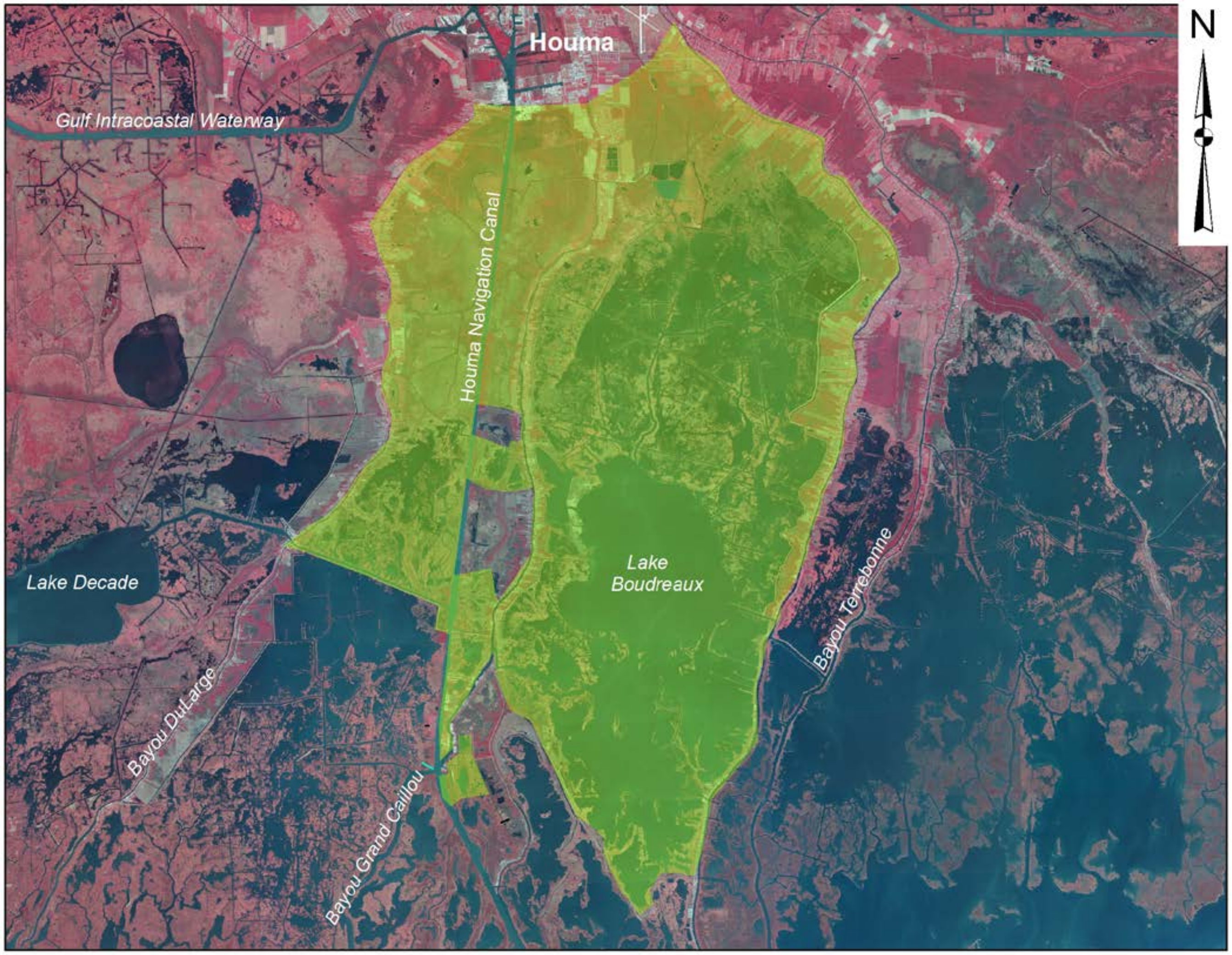

Figure 3-2: Area of Indirect Impact Analysis for the Constructible Features

impacts could be different. A significant portion (84 miles) of the levee alignment is on existing hydraulic barrier that limit aquatic movement. Of this hydraulic barrier, roughly 60 miles are along the natural bayou ridges which historically would have created separate basins with no aquatic connections except during extreme flood events. The constructible features would reduce the access to approximately 46,215 acres of marsh and water. To minimize some of these indirect impacts to the structures would have to remain open for longer periods of time. Also during PED the design of individual structures can be examined to verify that they are being design in such a way as to reduce the impact on ingress and egress. Recent peer reviewed articles (Eberhardt A. et al, 2011) suggest that it is possible to design structures in such a way.

The WVA models were designed to function at a community level and therefore attempt to define an optimal combination of habitat conditions for all fish and wildlife species utilizing coastal marsh ecosystems. During the development of these models the habitat requirements of 10 estuarine fish and shellfish, 4 freshwater fish, 12 birds, 3 reptiles and amphibians, and 3 mammals were examined. The use of this model for the mitigation of both the impacts to wetland and the some of the impacts to aquatic species is appropriate. As part of the trade off analysis between benefits from salinity intrusion prevention and aquatic access restriction additional fisheries impact analysis (such as CASM) can be done to determine if there are any additional impacts. This would use the updated H&H model that would include sea level rise.

Water Quality Indirect impact

With the increase in amount of time the structures are closed could lead to a degradation of the water quality in the system. The closures would change hydrologic patterns within the enclosed levee system and restrict tidal exchange of wetlands within the project area. Effects of such changes to water quality could include: changes to the salinity regimes. Reduction in salinities could improve water quality in the short term by reducing chelating potential of metals since total dissolved solids would be decreased. Also, reduction in salinity could decrease temperature variations in the fresher waters. Additional water quality impacts could include: alterations in water chemistry; decreased sediment and nutrient delivery; disruption of freshwater and marine organisms; reduction of tidal exchange and potential freshening of existing intermediate, brackish and saline marsh areas thereby resulting in habitat switching and related aquatic and terrestrial organisms utilizing less saline habitats; potential increase in freshwater areas which could limit more saline habitats but provide additional freshwater habitats for aquatic organisms; salinities would stabilize or decrease. Closures of the gates on the GIWW could limit the input of fresh water to rainfall only this could limit the flushing of the system. In the large basin wind generated waves would limit stagnation, but in smaller areas this could become a problem.

Navigation Indirect impact

Assuming sea levels do increase in the future the frequency of closures of the control structures would likely increase over time thereby causing some additional delays to navigation that frequent these structures. This could have economic consequences to industries and firms that rely on the commodities that are shipped over these waterways, as well as the shippers moving these goods depending on the length of closures. There could also be an impact to recreational users and commercial fishermen. As part of this project HNC would have a lock which would allow for navigation during times of closures. One potential mitigation measure in the future could be to convert the some or all of the floodgates in the system to locks by building a shorter gate on the protected side of the existing gate. This would require additional authorization and NEPA clearance in the future.

In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities.

If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate would be design for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.

Communities Flood Risk Impacts

Depending on the RSLR communities that are not presently protected by a low level levee would see and increased rate of tidal flooding due to non NHC watch events. Depending on how the system is operated these risk could be reduced. Other means to reduce the risk would be to elevate the homes or build ring levees. Either of these would require additional funding, but could allow for the system to remain open for a longer time frame.

3.5.4 RELATIVE SEA LEVEL RISE

Recent climate research by the Intergovernmental Panel on Climate Change (IPCC) predicts continued or accelerated global warming for the 21st Century and possibly beyond, which would cause a continued or accelerated rise in the global mean sea level. Engineering Circular (EC) 1165-2-*212, Sea-Level Change Considerations for Civil Works Programs,* released on October 1, 2011, provides guidance for incorporating the direct and indirect physical effects of projected future sea-level change in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects and systems of projects.

Coastal Louisiana’s low elevation, high rate of subsidence, and accelerated rate of wetland loss make it vulnerable to changes in sea level. Sea level change is defined and evaluated in terms of “relative sea level rise (RSLR),” which includes the effects of global and local sea-level change as well as local subsidence. The PAC report, unlike the 2002 report, includes surge and wave models that account for both sea-level rise and subsidence.

The EC specifically requires the development of three RSLR scenarios: low, intermediate, and high. Feasibility level designs, cost estimates, and benefit-cost ratios developed for the current alternatives are based primarily on the intermediate RSLR scenario of 2.4 feet. Floodgates on navigable waterways were designed to include 2.0 feet of structural superiority, which may accommodate higher levels of RSLR than 2.4 feet, but would not necessarily accommodate the high RSLR scenario of 4.75 feet in all cases. It is expected that the project would be constructed over a period of 40 or more years. If during that time RSLR rates are higher or lower than expected, then final levee heights and project costs would be adjusted accordingly. The structure heights would not change.

3.6 Public Concerns

The NEPA process provides for an early and open public process for determining the scope of issues, resources, impacts, and alternatives to be addressed in an EIS. This process is referred to as scoping. The scoping report documents comments from interested parties and describes where in the EIS individual comments should be addressed. It also outlines the study background and scoping process to date, and summarizes the key issues identified by members of the public during the initial scoping period.

CEMVN held a scoping meeting for a proposed hurricane and storm damage risk reduction system on May 12, 1993, in Houma, Louisiana and written comments were accepted from April 7 to May 24, 1993. Eleven letters were provided to the USACE and 52 individuals attended the scoping meeting. A scoping document that summarized comments and concerns was sent to all interested participants on April 12, 1994. The issues and concerns identified were considered during the planning and analysis of project alternatives.

The greatest area of public concern was related to the importance of providing hurricane and storm damage risk reduction for businesses and residences. Other concerns included potential adverse impacts to existing marshes, improvement of marsh habitat both inside and outside the proposed levee system, maintaining or improving ingress and egress of marine organisms for the benefit of commercial fisheries, and avoiding adverse water quality impacts.

A public meeting was held during the 45-day public commenting period for the RDPEIS. More details on that public meeting and public involvement and coordination can be found in Section 8.0, Public Involvement.

3.7 Purpose and Need

The purpose of this project is to provide hurricane and storm damage risk reduction for the communities located within the levee system. The overarching goal is to reduce the risk to people and property in the vicinity of Houma, Louisiana. All project benefits are related to hurricane and storm damage risk reduction. No flood damage reduction, navigation, or ecosystem restoration benefits are quantified for this project. The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level rise, and subsidence. Hurricanes and tropical storm tidal surges have caused immense property damage, human suffering, destruction of natural habitat, and loss of human life in the two-parish study area. While the TLCD is currently maintaining a system of forced drainage levees, pump stations, and flood control structures for Terrebonne Parish, adequate hurricane and storm risk reduction is not currently available for the entire area. This project represents an opportunity to reduce the risk of catastrophic hurricane and tropical storm damages by implementing an effective, comprehensive system for hurricane and storm damage risk reduction.

3.7.1 DAMAGES RELATED TO HURRICANES AND STORM SURGE

Lafourche and Terrebonne parishes periodically experience localized flooding from excessive rainfall events. However, the primary causes of flooding in the two parishes are hurricanes and tropical storm tidal surges. During the past 25 years, coastal Louisiana was impacted by eight major tropical events: Hurricane Juan (1985), Hurricane Andrew (1992), Tropical Storm Isidore (2002), Hurricane Lili (2002), Hurricanes Katrina and Rita (2005), and Hurricanes Gustav and Ike (2008). The tidal surges associated with these storm events have inundated structures and resulted in billions of dollars in damages. A summary of the total Federal Emergency Management Agency (FEMA) flood claims paid as a result of tropical storm events is shown in Table 3-3. The table includes the number of paid losses and the total amount paid on each loss. The table includes only those losses that were covered by flood insurance. Hurricanes Katrina and Ike required the largest sums paid, with $18 billion in claims paid for Katrina in 2005, and $2.6 billion in claims paid for Ike in 2008. These hurricanes also caused millions of dollars in emergency costs, such as sandbagging and police overtime, damages to roads and bridges, and the subsequent clean up of private, commercial, and public properties.

The significant flooding impact of Hurricane Ike in the town of Chauvin, located southeast of Houma, is shown in Figure 3-3. The town remained under water for nearly a week.

After being struck by hurricanes Katrina and Rita within one month, Terrebonne Parish was declared a Federal disaster area by the President of the United States. Damage assessment reports provided by FEMA and the Terrebonne Parish Department of Homeland Security revealed that the damages sustained in Terrebonne Parish included over 10,000 flooded homes and businesses and over 200 people displaced from their homes (Louisiana Speaks, 2011).

Table 3-3. FEMA Flood Claims Paid as a Result of Tropical Storm Events Affecting the Study Area, 1985 - 2008

Event	Month/Year	Number of Paid Losses	Total Amount Paid
Hurricane Juan	October, 1985	6,187	$184.3 million
Hurricane Andrew	August, 1992	5,589	$262.9 million
Tropical Storm Isidore	September, 2002	8,441	$137.7 million
Hurricane Lili	October, 2002	2,563	$44.7 million
Hurricane Katrina	August, 2005	167,099	$18 billion
Hurricane Rita	September, 2005	9,507	$523.4 million
Hurricane Gustav	September, 2008	4,524	$111.9 million
Hurricane Ike	September, 2008	46,137	$2.6 billion
Total:			**$21.9 billion**

Note: Total amount paid has been updated to the June 2010 price level using the CPI for all urban consumers. Source: FEMA.

Figure 3-3. Flooding Impacts of Hurricane Ike in Chauvin, Terrebonne Parish

As another example, over 800 homes were inundated in the coastal portion of Terrebonne Parish south of the City of Houma because of Hurricane Juan. Scattered pockets of flooding were also reported in the portions of Terrebonne and Lafourche Parishes north of Houma. Approximately 40 percent of the homes in the coastal areas of Lafourche Parish were also inundated by the high tides.

Agricultural damages from Hurricane Juan totaled $175 million, with 24 percent of these damages occurring in the two-parish study area. The soybean crop suffered over half of the agricultural damage, while the sugar cane crop incurred 20 percent of the damage. Excessive rains oversaturated the fields and caused a reduction in crop yields.

3.8 Opportunities

3.8.1 HURRICANE AND STORM SURGE RISK REDUCTION OPPORTUNITIES

To reduce the risk of damages caused by hurricanes and storms, the USACE has the opportunity to build upon the existing local levee system. The existing levees have a maximum elevation of 10 feet above sea level to protect against weak tidal and rainfall events, but not hurricanes. This project represents an opportunity to avoid catastrophic hurricane and tropical storm damages by implementing an effective, comprehensive system for hurricane and storm damage risk reduction.

3.8.2 COASTAL RESTORATION COORDINATION

The Morganza to the Gulf project is not a traditional hurricane risk reduction system in that it was also designed to be compatible with the strategic goals of the Coast 2050 Project. Some areas would experience increased tidal exchange thanks to environmental control structures through hydrologic barriers. This benefit would be consistent with the Coast 2050 goals to 'maintain exchange and interface to achieve system linkages' and 'maintain estuarine gradient to achieve diversity' (http://www.coast2050.gov/). More significantly, the Morganza to the Gulf project was designed to not interfere with dedicated dredging for marsh creation, the distribution of freshwater from the GIWW into wetlands, down Grand Bayou, and the multipurpose control of the HNC.

The HNC lock complex operation plan has been modified from the one that was proposed in the 2002 feasibility report (See section 4.3.8). The primary purpose of the HNC lock and floodgate structure is for storm surge control. A secondary benefit is the prevention of saltwater intrusion from impacting the Houma Water Treatment Plant and marshes internal of the system. A lock is being built to maintain the existing navigation during the operation for these purposes. Part of the lock complex operation plan is based on controlling chloride levels (a measure of the salinity) at the Houma Water Treatment Plant (See section 4.3.8.1).

After the HNC lock complex is constructed as part of the Morganza to the Gulf project, the LCA program proposes using the lock for ecosystem restoration purposes, such as distribution of freshwater. Proposed operational changes for LCA ecosystem restoration purposes, and associated impacts, are documented in the Final Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (USACE 2010). A supplemental NEPA document would be needed under the LCA program once a detailed operation plan is developed.

The project benefits were not based on any coastal restoration features but the levee system was designed not to interfere with future coastal restoration.

3.9 Planning Objectives

3.9.1 NATIONAL OBJECTIVE

The Water Resources Council's Economic and Environmental Principles for Water and Related Land Resources Implementation Studies states that, "The Federal objective of water and related land resources project planning is to contribute to national economic development consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements." If the projected benefits of coastal storm damage reduction measures exceed their estimated costs and are judged environmentally acceptable, their construction as a Federal project would contribute to this objective and be in the Federal interest.

3.9.2 PLANNING OBJECTIVE

The overarching goal is to reduce the risk to people and property from damages caused by hurricanes and storm surge in the vicinity of Houma, Louisiana.

3.10 Non-Federal Sponsor's Construction Efforts

The CPRAB and the TLCD are designing and constructing storm damage risk reduction structures along the authorized alignment at their own expense. Completed projects are limited to several miles of first-lift levees and a few floodgates and do not result in a closed hurricane and storm damage risk reduction system. In the absence of an executed Project Partnership Agreement (PPA), the locally constructed levees do not form an integral part of the Morganza to the Gulf project and the work performed by the non-Federal sponsor is not eligible for consideration and approval of work-in-kind credit, nor are the Land, Easements, Rights-Of-Way, Relocation, and Disposal Areas (LERRDs) acquired by the non-Federal sponsor in support of those levees eligible for credit consideration. In the absence of an executed PPA, the locally constructed levees do not form an integral part of the Morganza to the Gulf project, and the work performed by the non-Federal sponsor is not eligible for consideration and approval of work-in-kind credit. If the Morganza to the Gulf project is reauthorized, the non-Federal Sponsor would be entitled to LERRRDs credit for the real estate acquired for those local levees only to the extent that the non-Federal sponsor is required to provide authorization for entry to LERRDs necessary for any future Morganza to the Gulf project work that is conducted on the locally constructed levees. For more information see section8.4 of the associated PAC report.

Below is a brief description of the TLCD's risk reduction projects.

- <u>Levee Reach J-1:</u> First-lift construction was complete to elevation 9 feet in August 2009. The first-lift levee is 3.1 miles long.

- <u>Levee Reach H-3</u>: The first-lift levee is 3.4 miles and was constructed to elevation 12 feet but is expected to settle to 10 feet.

- <u>Levee Reach H-2</u>: The first-lift levee is 2.6 miles long with a height of between 10 and 12 feet.
- <u>Interim Barge Gate Structures on Placid Canal and Bush Canal</u>: The barge gate structures are being constructed to elevation 18 feet but tie-in to levees that are at elevation 10 feet. These interim structures would be removed and replaced with 56-foot-wide sector gates in the proposed Morganza to the Gulf project.

- <u>Pointe aux Chenes Floodgate and Tie-In Levee</u>: This project consists of a 56-foot-wide floodgate across Bayou Pointe aux Chenes and an associated tie-in levee. The western tie-in measures approximately 450 linear feet and is part of Levee Reach J-3. The eastern tie-in levee measures approximately 665 linear feet and is part of Levee Reach K. The tie-in levee and floodgate elevation is 10.0 feet. The first-lift levee is 1,100 linear feet.

- Levee Reaches F and G-1: This project consists of a 9.4-mile earthen levee, a 250-foot-wide floodgate across the HNC, and a 200-foot-wide gate across Bayou Grand Caillou.

3.11 Related Projects

Several existing and authorized water resource projects are located within the Morganza to the Gulf project area, including navigation, hurricane risk reduction, and ecosystem restoration projects. These projects are summarized below. The status of each project was verified by project sponsors in the fall of 2011.

3.11.1 NAVIGATION PROJECTS

Gulf Intracoastal Waterway (GIWW) Navigation Project

The GIWW is the portion of the Intracoastal Waterway located along the Gulf Coast of the United States. It is a navigable inland waterway extending approximately 1,050 miles from Carrabelle, Florida to Brownsville, Texas. The waterway provides a channel with a controlling depth of 12 feet, designed primarily for barge transportation. The GIWW was authorized by the River and Harbor Act of July 24, 1946, and prior River and Harbor Acts. Construction was completed in 1949.

The GIWW extends across the Morganza to the Gulf project area from Bayou Lafourche at Larose, through Houma, and to the Atchafalaya River. The waterway is not only important for commerce; it also supports a variety of other public purposes, including flood control, waterside commercial development, and water-based recreational activities.

Houma Navigation Canal (HNC) Project and Deepening Study

The HNC is a navigable waterway connecting the city of Houma and the GIWW directly to the Gulf of Mexico. The HNC was completed by local interests in 1962, but it is currently maintained by the Federal Government. The authorized channel is 15 feet deep and 150 feet wide from its intersection with the GIWW to Mile 0.0, and 18 feet deep by 300 feet wide to the Gulf of Mexico. The oil and gas industries in Houma rely heavily upon the 40-mile channel as a critical path to the Gulf of Mexico.

Given that the state is presently preparing an HNC Deepening Feasibility Study, there is the possibility that the HNC would be deepened in the future given the preliminary positive results of that feasibility study. However, in accordance with USACE planning regulations, and because of the uncertainties as to whether the HNC deepening would be authorized and funded, the Morganza to the Gulf project alternatives must assume that the current authorized depth of the canal, -15 feet, would remain as currently authorized in the foreseeable future.

3.11.2 HURRICANE AND STORM DAMAGE RISK REDUCTION PROJECTS

Larose to Golden Meadow, Louisiana, Hurricane Risk Reduction Project

The Larose to Golden Meadow project is a ring levee system that provides hurricane and storm damage risk reduction to roughly 25,000 people living on both sides of Bayou Lafourche, about 50 miles southwest of New Orleans in Lafourche Parish. The 43-mile levee system extends from Larose to a point two miles south of Golden Meadow, Louisiana. The proposed Morganza to the Gulf levee would be built on the north east and northern sections of the existing Larose to Golden Meadow levee system (C-North). The future-without condition for the Larose to Golden Meadow levee system is uncertain since the Larose PAC analysis is ongoing and future levee elevations for the existing Larose ring levee system have not yet been determined. If the Morganza project is re-authorized to the 1% AEP level of risk reduction, but the Larose project is (a) not re-authorized; (b) re-authorized to less than a 2% AEP level of risk reduction; or (c) is authorized but not supported by a financially capable Non-Federal Sponsor willing to execute a PPA, the Morganza project would have added costs to both offset induced stages on the existing Larose system and to complete the Morganza system to ensure no overtopping of the Larose C-North levees that could impact the Morganza risk reduction area. Therefore, the Morganza to the Gulf PAC analysis assumes no further upgrades to the Larose to Golden Meadow system to ensure that all potential costs to complete the Morganza system are considered.

TLCD Risk Reduction Projects

The non-Federal sponsor has started work on reaches that were initially proposed to be a part of the Morganza to the Gulf project, at their own expense, acknowledging that there is no signed PPA in place. The sponsor has substantially completed approximately nine miles of levees and a few floodgates located along the proposed Morganza to the Gulf project alignment. More details on TLCD’s project plans and progress can be found in Section 3.10.

3.11.3 COASTAL RESTORATION PROJECTS

Coastal Impact Assistance Program (CIAP)

Falgout Canal Freshwater Enhancement Project The Energy Policy Act of 2005 established the CIAP program, which authorizes funds for environmental conservation, protection, restoration, or mitigation purposes to be distributed to Outer Continental Shelf oil- and gas-producing states. Terrebonne Parish and the State of Louisiana dedicated CIAP funding to the Falgout Canal Freshwater Enhancement project. The project is located in the marshes adjacent to Falgout Canal between Bayou du Large and the HNC (Figure 3-1). This project would include construction of an inlet structure at a site located on the HNC north of Falgout Canal, modeling of the basin, and channel improvements, as necessary, to improve efficiency of freshwater flow within the basin area. In addition, existing structures along Falgout Canal would be improved or replaced to facilitate operation and maintenance and to accommodate the possible placement of shoreline protection along unprotected areas of the HNC. If sufficient funding exists, the project could be expanded to facilitate movement of freshwater, nutrients, and sediment to the hydrologic unit south of Falgout Canal. Project benefits include freshwater flow enhancements to approximately 5,000 acres of existing marsh. The goal of this project is to restore project-area salinities to levels that are favorable for fresh and intermediate marshes. As of the writing of this report, modeling has been completed and funding is now in place for design and construction.

This project is located along the proposed footprint of the Morganza to the Gulf project, Reach E, where culverts are also being proposed for environmental benefits. Terrebonne Parish is currently coordinating with CEMVN to capture synergies and efficiencies between the two projects.

GIWW Bank Restoration of Critical Areas in Terrebonne Parish This project would close four breaches along the south bank of the GIWW totaling 14,500 linear feet. The breach closures engineered for this bank line would provide immediate benefits to the adjacent thin-mat floating marshes by stopping water movement through these large breaches where water exchange now occurs. This project was initially engineered, designed, permitted, and received the necessary land rights for construction through the CWPPRA Program. The CIAP program is building only the portion of the project that includes the most critical four breaches as described above. CIAP-funded construction was completed in 2010. More details regarding the CWPPRA portions of the project are provided below.

Small Dredge Program This program involves the use of a small dredge to hydraulically dredge borrow canals and other open water areas to restore approximately 175 acres of marsh apron along levees, cheniers, and roadways near Golden Meadow, on the west side of Bayou Lafourche. Construction was completed in 2010.

Atchafalaya River Long Distance Sediment Pipeline (ARLDSP) This project would restore marsh and ridge habitat in eastern and central portions of the Terrebonne Hydrologic Basin. Although in the conceptual phase at the time of this writing, the proposal is to install a pipeline and required booster pumps and outlets from the Atchafalaya River near Morgan City to transport sediment slurry to eastern and central Terrebonne Basin marshes. Marsh restoration locations would be selected to enhance the sustainability of existing and planned levee systems. The primary project purpose is to identify and apply appropriate design, engineering, and construction techniques so that strategies and infrastructure may eventually become components of larger-scale, system-wide marsh and ridge restoration projects in the basin in the future. Information gained from the planning and design for the Barataria Basin segment of the Mississippi River Long Distance Sediment Pipeline would be fully integrated into the design and implementation of the proposed Terrebonne Basin segment.

Louisiana Coastal Area (LCA) Plan

Title VII of WRDA 2007 authorized the LCA plan to support coastal restoration projects in Louisiana. More information may be found on the LCA website (http://www.lca.gov). The following LCA projects occur within or adjacent to the study area. Several LCA projects authorized by WRDA 2007 are located within the Morganza study area, including but not limited to: (1) Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (2) Modification of Davis Pond Diversion and (3) Land Bridge between Caillou Lake and Gulf of Mexico. By letters dated August 20, 2012 and October

16, 2012, CPRAB has notified the Corps that it desires to suspend study and design on these projects. The decision of CPRAB to suspend these projects results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA. CPRAB may be seeking other avenues to fund these projects.

Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock The Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock is one of six near-term critical restoration projects identified in the LCA Plan and is directly linked to the Morganza to the Gulf project, even sharing much of the same project area. The Final Integrated Feasibility Study/Environmental Impact Statement for this project was completed in September 2010. The recommended plan would redistribute existing freshwater to benefit Terrebonne marshes using a variety of measures. Additionally, the following measures to restrict, increase, and control water are proposed for each of the three project-area subunits. In the West – Bayou Penchant Area – dredging, bank protection, a sediment plug, and a weir would be used. In the Central – Lake Boudreaux Area – culverts, levees, dredging, marsh terraces, and berms, sediment plugs, modified operation of the future HNC lock complex, and a large sluice gated box culvert are proposed. In the East – Grand Bayou Area – culverts, dredging, gaps in canal spoil banks, marsh berms, sediment plugs, and removal of a weir and soil plug are proposed.

The recommended plan assumes that the HNC lock complex would be constructed and operated as part of the Morganza to the Gulf project to control storm surge and saltwater intrusion, but could also be operated for environmental purposes as part of the LCA Convey Freshwater to Northern Terrebonne Marshes/Multipurpose Operation of the Houma Navigation Lock project. For the multipurpose operation to occur, the LCA project would have to develop an OMRR&R plan that goes above and beyond the plan developed for the Morganza to the Gulf project. By letters dated August 20, 2012 and October 16, 2012 the State formally notified the Corps of the State's path forward for the LCA Program. The HNC Lock Complex that provide for inland waterway transportation, are a Federal responsibility for OMRR&R. Any changes to the operation plan would have to be coordinated with US Army Corps of Engineers and potentially require a supplemental NEPA document.

Davis Pond Freshwater Diversion This project was being evaluated under the LCA plan as a Federal/state cooperative action. By letter dated October 16, 2012 the State formally requests suspension of expenditures on this project by the Corps of Engineers. The diversion structure was authorized for construction in 1986 and completed in 2002. Located on the west bank of the Mississippi River in St. Charles Parish, the Davis Pond diversion could bring up to 10,650 cubic feet per second (cfs) from the Mississippi River to marshes south of the river. The benefits occur almost exclusively in the Barataria Basin. However, some of the flows could extend to the eastern portion of the Terrebonne Basin via the GIWW. The resulting higher stages in the GIWW may have a minor influence on eastward flows of the GIWW to Grand Bayou (Figure 3-1).

Small Bayou Lafourche Reintroduction This LCA project would reintroduce flow from the Mississippi River into Bayou Lafourche. The flow would be continuous and would increase riverine influence in the wetlands between bayous Lafourche and Terrebonne, south of the

GIWW. Several alternatives are being considered that would provide year-round flow into the bayou, including gated culverts and a pump/siphon station at Donaldsonville. Additional features that would be required, regardless of the type of diversion structure built, include modification of existing infrastructure, bank stabilization, dredging, and channel improvements. This project could reduce saltwater intrusion in the eastern Terrebonne marshes. Moreover, potential measures to improve distribution of Bayou Lafourche reintroduction waters (e.g., enlargement of Bayou L'Eau Bleu and/or Grand Bayou) could facilitate efforts to move Atchafalaya waters into areas of critical need. The State and the Corps have not signed a PPA for this project.

<u>Maintain Land Bridge between Caillou Lake and Gulf of Mexico</u> This LCA project would maintain the land bridge between Caillou Lake and the Gulf of Mexico by placing shore protection in Grand Bayou du Large to minimize saltwater intrusion. This feature would involve rock armoring or marsh creation to plug/fill broken marsh areas on the west bank of lower Grand Bayou du Large, thereby preventing a new channel from breaching the bayou bank and allowing a new hydrologic connection with Caillou Lake. Gulf shoreline armoring might be required where shoreline retreat and loss of shoreline oyster reefs has allowed increased water exchange between the gulf and the interior water bodies (between Bay Junop and Caillou Lake). By reducing marine influences in these interior areas, this feature would allow increased freshwater influence from Four League Bay to benefit marshes in the surrounding areas. By letter dated October 16, 2012 the State formally requests suspension of expenditures on this project by the Corps of Engineers.

The Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA)

CWPPRA of 1990 was the first Federal statutory mandate for restoration of Louisiana's coastal wetlands. The CWPPRA Task Force is composed of five Federal agencies: USACE, U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and Natural Resources Conservation Service (NRCS), and the State of Louisiana. The CWPPRA program plans projects to have a 20 year project life. The present authorization would end in 2019 and there is uncertainty with respect to if the program would be reauthorized and funded. CWPPRA has many restoration projects located within or adjacent to the Morganza to the Gulf project area in Terrebonne Parish. These projects may have an effect on the hydrology or habitats in the project area. More information may be found on the CWPPRA website (http://lacoast.gov).

<u>Brady Canal Hydrologic Restoration</u> This project is located 21 miles southwest of Houma, Louisiana, in Terrebonne Parish and is bounded by Turtle Bayou to the east, Bayou DeCade to the south, and Bayou Penchant to the north. Land loss in the area has been caused by saltwater intrusion, subsidence, and increased tidal energies. The project measures include replacing and maintaining weirs, constructing a rock plug, stabilizing channel cross sections, and restoring and maintaining channel banks. These measures maintain and enhance existing marshes and increase the use of sediment and fresh water introduced from the water control structures and overbank flow. Construction was completed in July 2000. A monitoring plan has been developed, and the Louisiana Department of Natural Resources is currently collecting data so that the project's effectiveness can be evaluated.

Central Terrebonne Freshwater Enhancement Grand Pass in Terrebonne Parish is a 900-foot-wide artificial cut through the Bayou du Large Ridge south of Lake Mechant. The project would reestablish the historic ridge function of Bayou du Large that separated Lake Mechant from the gulf. This would moderate salinities that have adversely impacted the marshes to the north of Lake Mechant. The project would also increase the Atchafalaya River freshwater influence in the area by modifying the current structure located in Liners Canal north of Lake Decade, and provide maintenance dredging at Minors Canal to maintain optimal freshwater conveyance from the GIWW. The project is currently in the Planning and Design Phase and is expected to receive Phase II funding in 2013. This project could synergistically increase beneficial impacts of the Morganza to the Gulf project if both are implemented.

GIWW Bank Restoration of Critical Areas in Terrebonne In the past 20 years, as the efficiency of the Lower Atchafalaya River has decreased; flooding in the northwestern portion of Terrebonne Parish has increased because of amplified Atchafalaya River flows via the GIWW, causing deterioration of fresh and intermediate wetlands. This project is designed to restore and stabilize critical lengths of deteriorated channel banks of the GIWW with hard shoreline stabilization materials to control damaging overflows and saltwater intrusion detrimental to area marshes. This project could impact the Morganza to the Gulf study area by reducing the loss rates of fresh marsh along the GIWW. Construction is expected to begin in December 2011 and be completed by July 2012.

Lost Lake Marsh Creation and Hydrologic Restoration The project is located in Terrebonne Parish near the vicinity of Lost Lake (Figure 3-1). Approximately 465 acres of marsh would be created between Lake Pagie and Bayou De Cade, north of Bayou De Cade, and along the northwestern Lost Lake shoreline. Borrow material would be taken from within Lost Lake and pumped via a hydraulic dredge into the marsh creation sites. Tidal creeks would be constructed within the marsh creation cells to ensure tidal connectivity and prevent ponding within the created marsh. In addition, 30,000 linear feet (26 acres) of terraces would be constructed to reduce fetch in an area of deteriorated marsh north of Bayou De Cade. Four fixed-crest weirs would be replaced with variable-crest structures to increase freshwater and sediment delivery from the Atchafalaya River/Four League Bay system and to provide flow-through conditions in the system. Similar structures would be installed along Little Carencro Bayou to increase freshwater and sediment delivery into the marshes north of Lost Lake. Construction is expected to begin in 2013.

Madison Bay Marsh Creation and Terracing This 1,019-acre project is located in Terrebonne Parish north of Madison Canal between Bayou Terrebonne and Humble Canal. This area has experienced tremendous wetland loss due to a variety of forces including subsidence, salt water intrusion, a lack of sediment supply, and oil and gas activities. Project goals include creating 417 acres of marsh and nourishing 258 acres of marsh. Proposed terraces would reduce the wave erosion of created and existing marshes along Madison Bay. Approximately one-half of the marsh creation area would be planted with smooth cord-grass (*Spartina alterniflora*) or marsh hay cord-grass (*Spartina patens*). Reducing shoreline erosion would protect about six acres of existing marsh, and the percent cover of submerged aquatic vegetation (SAV) is projected to increase in the project area. Funding for the construction of this project has not yet been approved.

North Lake Boudreaux Basin Freshwater Introduction and Hydrologic Management. The purpose of the project is to reduce deterioration and loss of area marshes by seasonally introducing fresh water from the Houma Navigation Canal. This project includes the construction of a freshwater conveyance channel with water management gates and the installation of several outfall management structures to allow drainage and reduce ponding of water.

North Lake Mechant Landbridge Restoration This project was completed in 2009 to protect and restore a critical landbridge barrier between the easily erodible fresh marshes north of Bayou De Cade and the higher saline environment of Lake Mechant. Material dredged from northern Lake Mechant was used to create marsh. Smooth cord grass was also planted along the shorelines of Lake Mechant, Goose Bay, and Lake Pagie. The project also repaired breeches formed by erosion and oilfield access canals that threaten the integrity of the landbridge. Shoreline vegetation plantings were installed in summer 2003. Approval of construction unit two was granted in October 2004, which included dedicated dredging for marsh creation and several other bank stabilization measures. Problems surrounding the recently established public oyster seed grounds and several private oyster leases in Lake Mechant were resolved and construction of that unit was completed in late 2009.

Penchant Basin Natural Resources Plan, Increment 1 Construction of this project began in May, 2010 and was completed in May, 2011. The project is bounded on the north by the GIWW, the east by a north/south line from Lake De Cade to the GIWW, the south by Lake Mechant and Lost Lake, and to the west by a north/south line from Lost Lake to Avoca Island. This project combines the long-term realignment of Penchant Basin hydrology with restoration and protection measures aimed at maintaining the physical integrity of the area during the transition toward greater riverine influence. The project includes about 6,520 feet of foreshore rock dike along the southern bank of Bayou Chene at its intersection with Bayou Penchant and approximately 35 acres of marsh creation. Two freshwater introduction structures were constructed to improve freshwater conveyance from Bayou Penchant into the central Terrebonne marshes. Earthen embankments were constructed and maintained on the north bank of Bayou De Cade between Lake De Cade and Turtle Bayou and between Voss Canal and Lost Lake.

South Lake De Cade Freshwater Introduction This project is located approximately 15 miles southwest of Houma, Louisiana. The project area is experiencing marsh deterioration due to subsidence, rapid tidal exchange, and human-induced hydrologic changes that result in increased salinities. Shoreline erosion along the south embankment of Lake De Cade threatens to breach the hydrologic barrier between the lake and interior marshes. Proposed project components include installing three control structures along the south rim of the lake and enlarging Lapeyrouse Canal to allow the controlled diversion of Atchafalaya River water, nutrients, and sediments south into project area marshes. Outfall management structures are planned in the marsh interior to provide better distribution of river water. Additionally, approximately 1.6 miles of foreshore rock dike is planned to protect the critical areas of the south lake shoreline from breaching. Construction began in August 2010 and is expected to be completed in August 2013.

Terrebonne Bay Marsh Creation - Nourishment Project This project is located along the northern shoreline of Lake Barre/Terrebonne Bay near Bayou Terrebonne continuing east a short distance past Bayou Chitique. The high loss rate of emergent marshes north of Terrebonne Bay has directly contributed to the ongoing flooding problems of many communities along Bayou Terrebonne, including the town of Montegut. The proposed features of this project consist of filling approximately 365 acres of shallow open water and nourishing approximately 299 acres of very low or fragmented marsh with material hydraulically dredged from Terrebonne Bay/Lake Barre. Containment dikes would be degraded or gapped within three years of construction to allow for greater tidal and estuarine organism access. The project would result in approximately 353 net acres of marsh over the 20-year project life. This project is still in the planning stage and has not yet received construction authorization.

West Lake Boudreaux Shoreline Protection and Marsh Creation This project is located in the Terrebonne Basin along the western shoreline of Lake Boudreaux. Project construction began in July 2007 and was completed in April 2011. The west bank of Lake Boudreaux has experienced high erosion rates due to wind-driven waves and high water. The project's objectives include: reducing erosion of the west Lake Boudreaux shoreline to protect 80 acres of emergent marsh and SAV; maintaining the shallow, open water habitat, including its SAV, located west of the lake rim; and creating 284 acres of marsh along the southwestern shoreline of Lake Boudreaux and at interior marsh sites through the deposition of dredged material.

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4. ALTERNATIVES

In the evolution of this project, several sets of alternative plans have been developed and evaluated with the goal of maximizing the number of residential and commercial structures protected while minimizing adverse impacts to the environment, local interests, navigation, and industry. This section summarizes those alternative plans, including those retained for further analysis and those eliminated during the evaluation and screening process. A summary of the potential environmental impacts associated with each alternative is provided at the end of this section. For a more detailed description of plan formulation, the screening processes, and the final array of alternatives, please refer to the Alternative Plans section of the Morganza to the Gulf PAC report.

4.1 Future-Without Project Condition (No Federal Action)

Evaluation of the No Action Alternative, also known as the future-without-project condition, is a requirement of NEPA regulations. This alternative assumes no Federal project implementation and forms the basis on which all other alternative plans would be measured. Under the future-without-project condition, the TLCD would continue to operate the forced drainage and partial hurricane risk reduction system that currently exists. The existing system contains segments and components, including ring levees, pump stations, and flood gates that have been built to be individually self-sufficient. This work does not provide a closed system or the levee and structure heights needed to protect surrounding communities from hurricanes and tropical storm tidal surges. Under the No Action Alternative, storm surges would continue to cause immense property damage, human suffering, destruction of natural habitat, and loss of human life in the two-parish study area.

4.2 Alternatives Considered in Preliminary Analyses

This section summarizes post-authorization changes that have resulted in alternative plans that have been developed and evaluated for the project. The USACE term “Recommended Plan” is synonymous with the NEPA term “Preferred Alternative.” This is the plan preferred by the USACE.

4.2.1 2008 MORGANZA TO THE GULF HURRICANE RISK REDUCTION FOR 1% AEP EVENT

Designs for the final alternatives analyzed in the 2002 Morganza to the Gulf Feasibility Study and PEIS were developed well before Hurricane Katrina’s devastating impact on the hurricane risk reduction levees in New Orleans in August, 2005. The authorized MR&T project, Morganza to the Gulf of Mexico, was intended to function as a 1% AEP hurricane and storm damage reduction system. As part of updating the 2002 Feasibility Study, the MVN design team was tasked with updating alternatives to incorporate new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

Four action alternatives, three of which are based on levee alignments from the 2002 feasibility report, were developed in coordination with the CPRAB and TLCD in 2008. Alternatives 1, 2, and 3 were formulated to provide hurricane risk reduction at the post-Katrina 1% AEP (100-year) storm surge event. In contrast, Alternative 4 included the levee and structure elevations used in the 2002 feasibility report, ranging from 10.0 to 16.0 feet (NAVD 88). This alternative would not meet post-Katrina design standards to reduce the threat of coastal flooding from the 1% AEP storm surge event.

A brief description of each of the 2008 alternatives is provided below. Each alternative extends from Bayou Black to Grand Bayou Canal and consists of similar levee sections and structures. To reduce the potential for new indirect impacts on estuarine hydrology, the alternatives include numerous culverts to allow hydrologic exchange through the levees.

Alternative 1

Alternative 1, based on the Recommended Plan (Modified Highway 57, Alternative 6) from the 2002 feasibility study, was re-designed to provide hurricane risk reduction up to the 1% AEP (100-yr) surge. Alternative 1 is approximately 65 miles long and has structures and levees ranging from 18.5 to 28.5 feet and is shown in Figure 4-1.

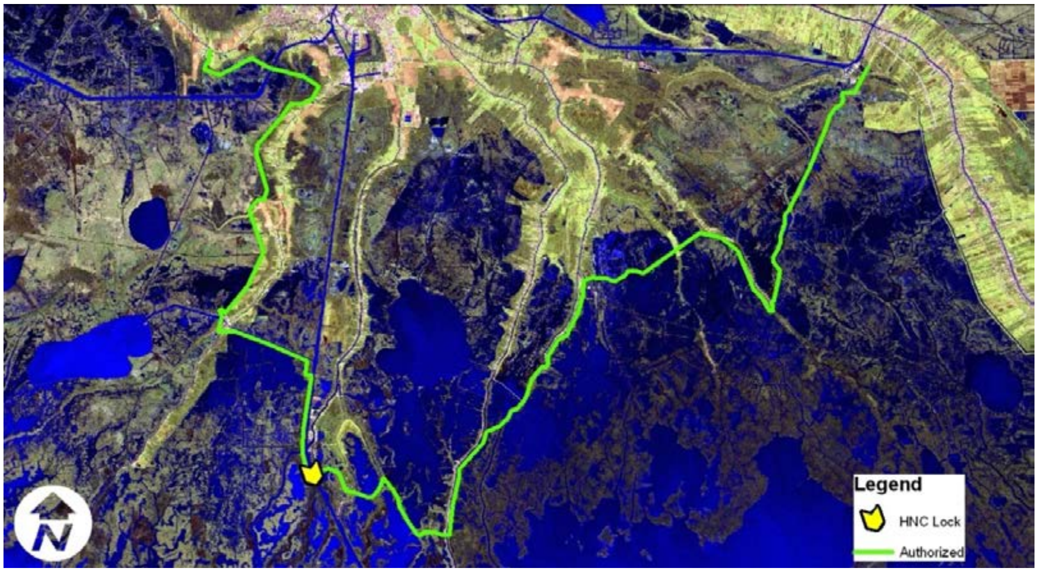


Figure 4-1. Levee Alignment for Alternatives 1 and 4 (authorized alignment)

Alternative 2

Alternative 2, based on the Reconnaissance Alternative (Alternative 5) from the 2002 feasibility study, was re-designed to provide hurricane risk reduction up to the 1% AEP (100-year) surge. Alternative 2 is approximately 55 miles long with levee/structure elevations ranging from 18.5 feet to 28.5 feet (NAVD 88). This alternative's alignment is the same as the alignment in Alternative 1 on the eastern side of the project, but turns north at Bush Canal on the western side (Figure 4-2).

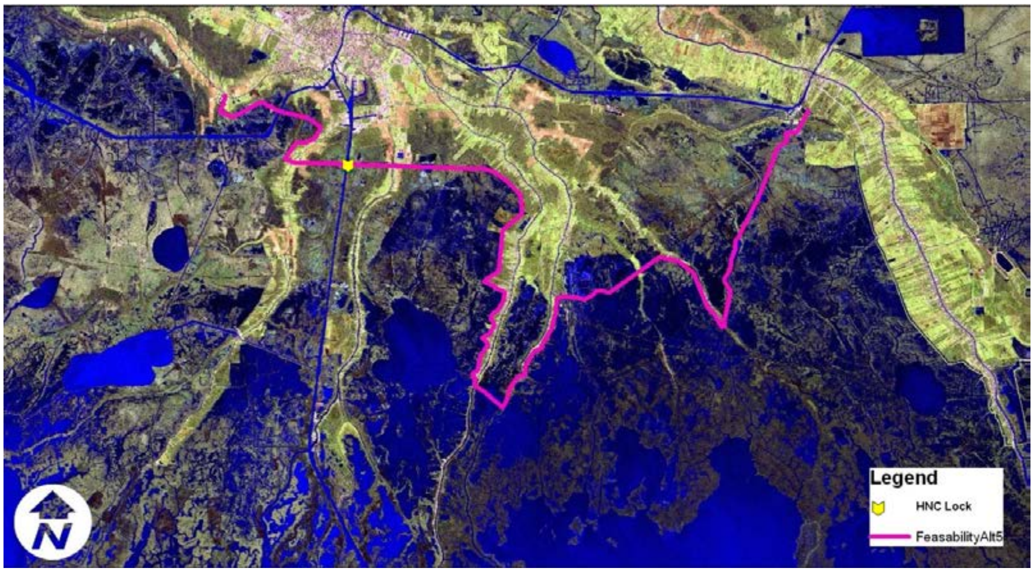


Figure 4-2. Alternative 2 Levee Alignment

Alternative 3

Alternative 3 is based on a Multiple Lines of Defense Strategy (MLODS) alignment presented to the Corps by a group of non-governmental organizations (NGOs) in April 2008 and was not previously considered in the feasibility report. This alternative was also intended to provide hurricane risk reduction up to the 1% AEP (100-yr) surge. The Alternative 3 alignment is similar to Alternative 2 but also includes Theriot and Dulac ring levees (Figure 4-3). It deviates from alternative 2 by following the ridge along Montegut Road then heading northeast near the intersection of with Pointe Aux Chenes Road. Including the two ring levees, Alternative 3 is approximately 63 miles long with levee/structure elevations ranging from 18.5 feet to 23.0 feet (NAVD 88).

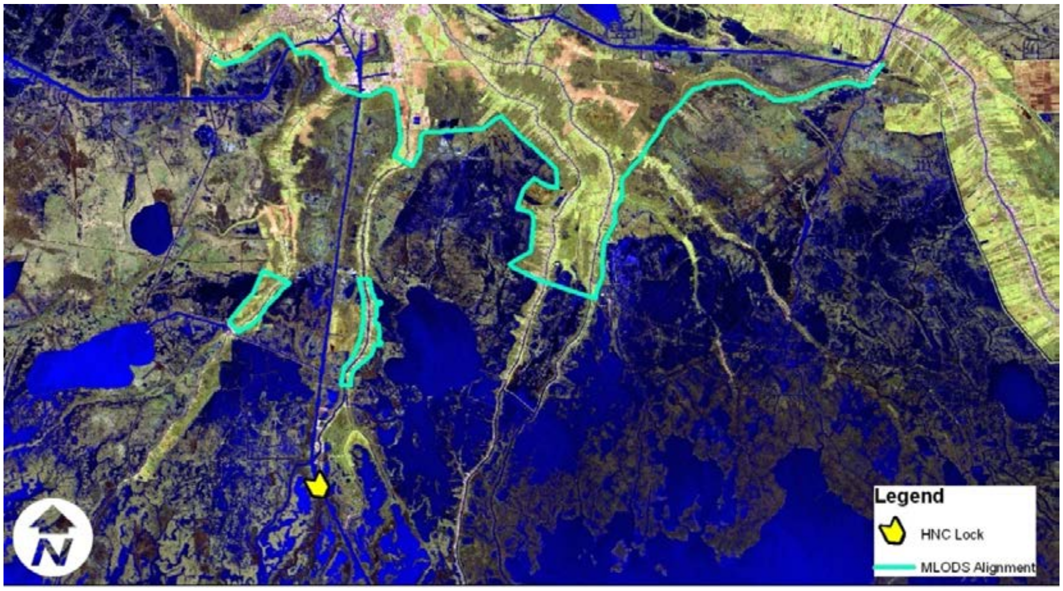


Figure 4-3. Alternative 3 Levee Alignment

Alternative 4

Alternative 4 is most similar to the 2002 feasibility study Recommended Plan, sharing not only the same alignment but also having similar levee and structure heights. Levees, locks, floodgates, environmental facilities and floodwalls were reengineered to meet post-Katrina design criteria, but not the post-Katrina 1% AEP (100-year) design elevations. Levee/structure elevations for this alternative range from 11.0 feet to 15.0 feet (NAVD 88). Alternative 4 is approximately 65 miles in length. The alignment for this alternative is the same as that of Alternative 1 (Figure 4-1).

Comparison of 2008 Alternatives

The four alternatives were compared for their average annual benefits (the value of prevented hurricane and storm-surge damages) versus annualized costs (design and construction costs, etc.) over a period of analysis from 2010 to 2060. The analysis factored in without-project potential future damages under low and high scenarios for RSLR. Potential damage estimates included damages to residential and non-residential buildings, agricultural resources, transportation infrastructure, and other categories. The alternatives were also compared in terms of both their adverse direct and beneficial effects on wetland habitat in the study area. Please refer to the PAC report for a more comprehensive discussion on the comparison of the four alternatives.

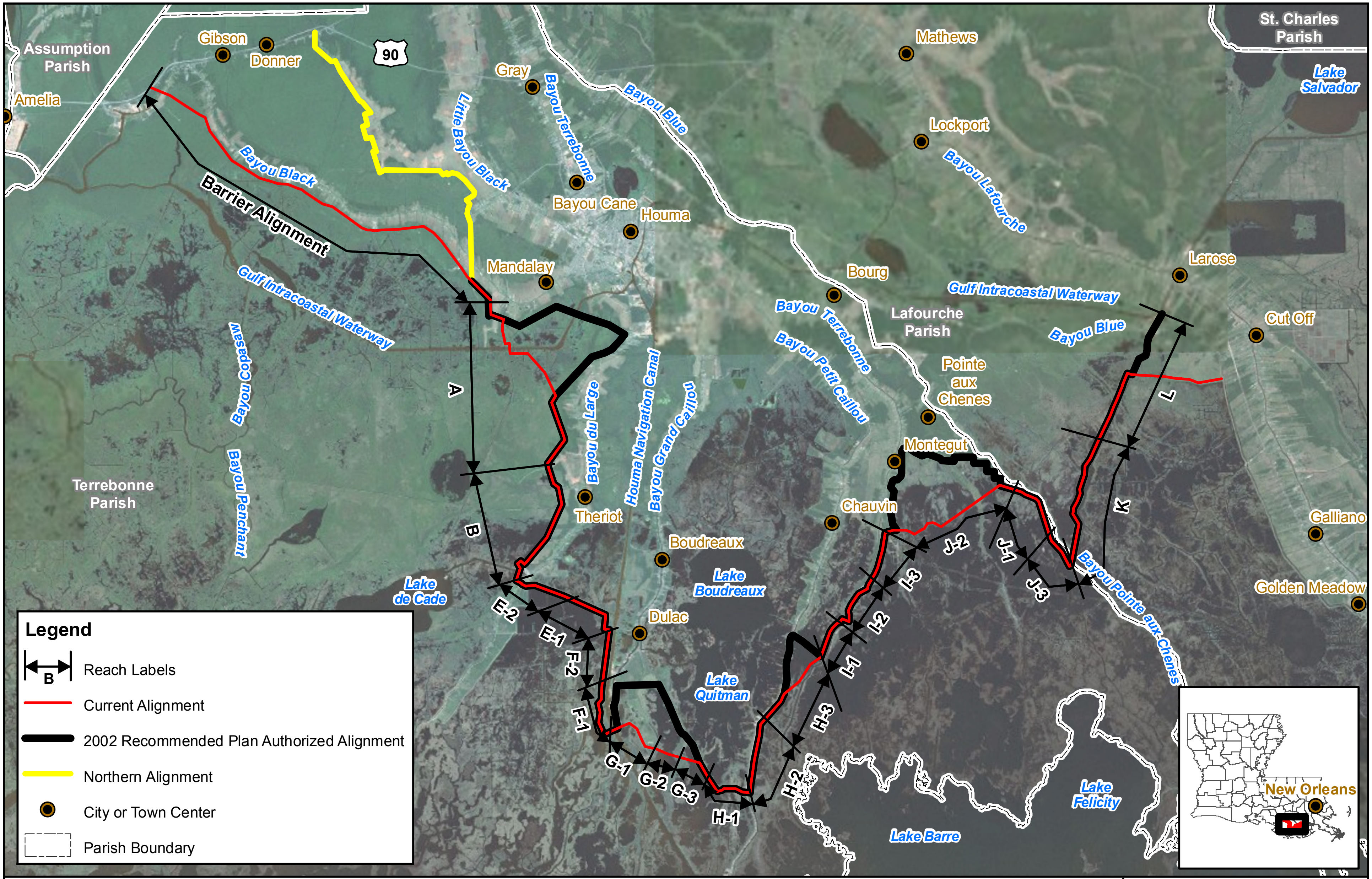
The results of these comparisons revealed that only alternatives 1 and 4, both of which incorporate the authorized alignment (Recommended Plan in 2002 feasibility report) (Figure 4-1), were economically justified with a benefit/cost ratio over 1.0. Alternatives 1 and 4 were shown to impact the least acreage of bottomland hardwood (dry and wet), and had the largest water storage area behind them in case of levee overtopping from waves and storm surges. Therefore, alternatives 2 and 3 were dropped from further analysis, and alternatives 1 and 4 were retained for detailed evaluations.

4.2.2 REFINEMENTS TO THE AUTHORIZED ALIGNMENT

After the 2008 analysis, the authorized levee alignment was refined to reduce costs, reduce direct environmental and cultural resources impacts, and improve risk and reliability based on lessons learned from Hurricane Katrina. For example, advances in storm surge modeling revealed that narrow, sharp indentations in the alignment can lead to stacking of surge, which increases risk and makes the levee less reliable. For these reasons, the levee was extended to the west and east, and reaches A, G, H, J, and L of the authorized alignment were modified (Figure 4-4). All of the refinements resulted in more cost effective plans and reduced direct environmental impacts.

Levee Extension

Based on higher post-Katrina surge levels, the authorized alignment was extended to the west to tie into high ground. Two alternative alignments were considered—a “Barrier Alignment” and a “Northern Alignment” both alignments originate at Minor’s Canal.



N

0 2.5 5
Miles

Figure 4-4. REFINEMENTS TO THE AUTHORIZED ALIGNMENT

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 4-4
Date: February 2012
Scale: 1:320,000
Source: USACE/GEC
Map ID: 273160010-2811

- The Barrier Alignment is 15.4 miles long and generally follows the edge of development along the south side of the Bayou Black Ridge (LA 182/Old US 90).

- The Northern Alignment is 15.6 miles long and runs west along Bayou Black Ridge for approximately 2 miles, then turns north and follows Savane Road (Parish Road 23) up to the Little Bayou Black Ridge. The alignment then follows the southern development boundary along Bull Run Road (Chacahoula ridge) northwest until it ties in to Highway 90.

As shown in Figure 4-4, the Barrier Alignment incorporates additional assets not included within the Northern alignment. The elevations and lengths of the Barrier and Northern alignments are similar but the Barrier Alignment would reduce risk to more people and structures. The Barrier Alignment was selected to complete the Morganza to the Gulf levee alignment.

The following paragraphs briefly describe the various options .evaluated for reaches A, G, H, J, and L and summarize the cost and environmental impact comparisons. More detailed discussions are found in PAC Report.

Reach A

In October 2009, the USACE evaluated three alignment options for Reach A (Figure 4-5):

- A1: 11.8 miles of levee, four box culvert locations
- A1-A: 14.3 miles of levee, four box culvert locations
- A2: 10.3 miles of levee, two box culvert locations
- A3: 9.2 miles of levee, four box culvert locations

Each alternative includes a 125-foot floodgates with nine 16 foot sector gates on the GIWW west of Houma and a , a 125-foot floodgates with three 16 foot sector gates on the GIWW east of Bayou Lafourche, one 56-foot sector gate at Minors Canal, and 6-ft by 6-ft box culverts at four locations, except for the A2 Alignment which has only two box culvert locations also has three tainer gates associated with the sector gate. All earthen levees would be constructed from material hauled in from off-site borrow sources.

Cost estimates included the cost of construction, real estate, and mitigation. Environmental impacts were evaluated based on the amount of direct and indirect impacts to both marsh and bottomland hardwoods (wet and dry), and the approximate cost of mitigation.

Originally, Option A3 was selected because it was the most cost effective of the four alignment options. The alignment was later modified to exclude the agricultural area with the potential for future development (see area protected by Option A1A in PAC figure 5-1). The alignment designated as “Current Alignment” in PAC figure 5-1 is the Reach A alignment carried forward into the Morganza to the Gulf PAC levee alignment. Compared to the original authorized alignment, this alignment would impact more acres of bottomland hardwood (dry) but would impact fewer acres of bottomland hardwood (wet) and marsh. Option A3 would enclose approximately 1,500 additional acres compared to A1, but box culverts would reduce any potential indirect impacts to water exchange.

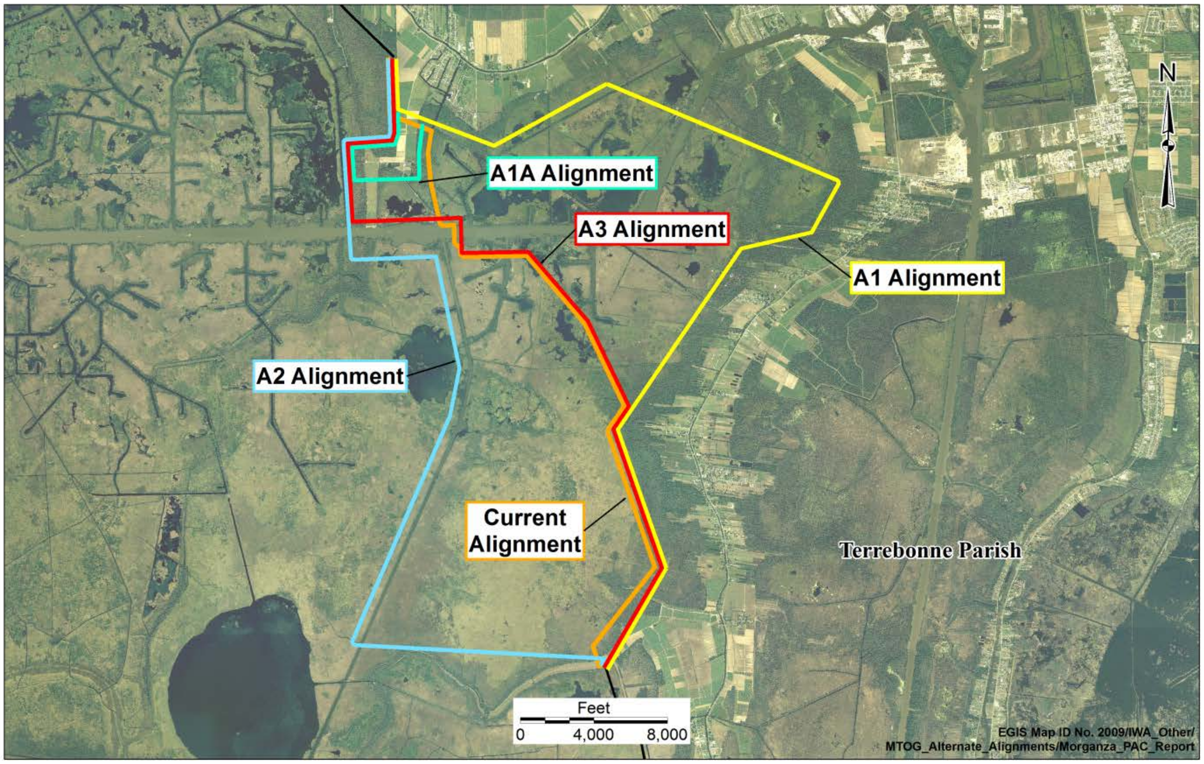


Figure 4-5. Alternative Alignments Analyzed for Reach A

Reach G

In October 2009, the USACE evaluated five alignment options for Reach G (Figure 4-6). The options included the authorized alignment from the 2002 feasibility report, an alignment developed during PED, and three other alignments developed for the PAC report as follows:

- PED Alignment (5.25 miles): Includes one road crossing, a 30’ stop log, and two drainage structures
- PAC 1 Alignment (4.60 miles): Includes one road crossing, a 30’ stop log, and two drainage structures
- PAC 2 Alignment (4.29 miles): Includes one road crossing, a 30’ stop log, and three drainage structures
- PAC 3 Alignment (4.90 miles): Includes one road crossing and two drainage structures
- Feasibility Alignment (authorized alignment) (7.48 miles): Includes one road crossing and two drainage structures

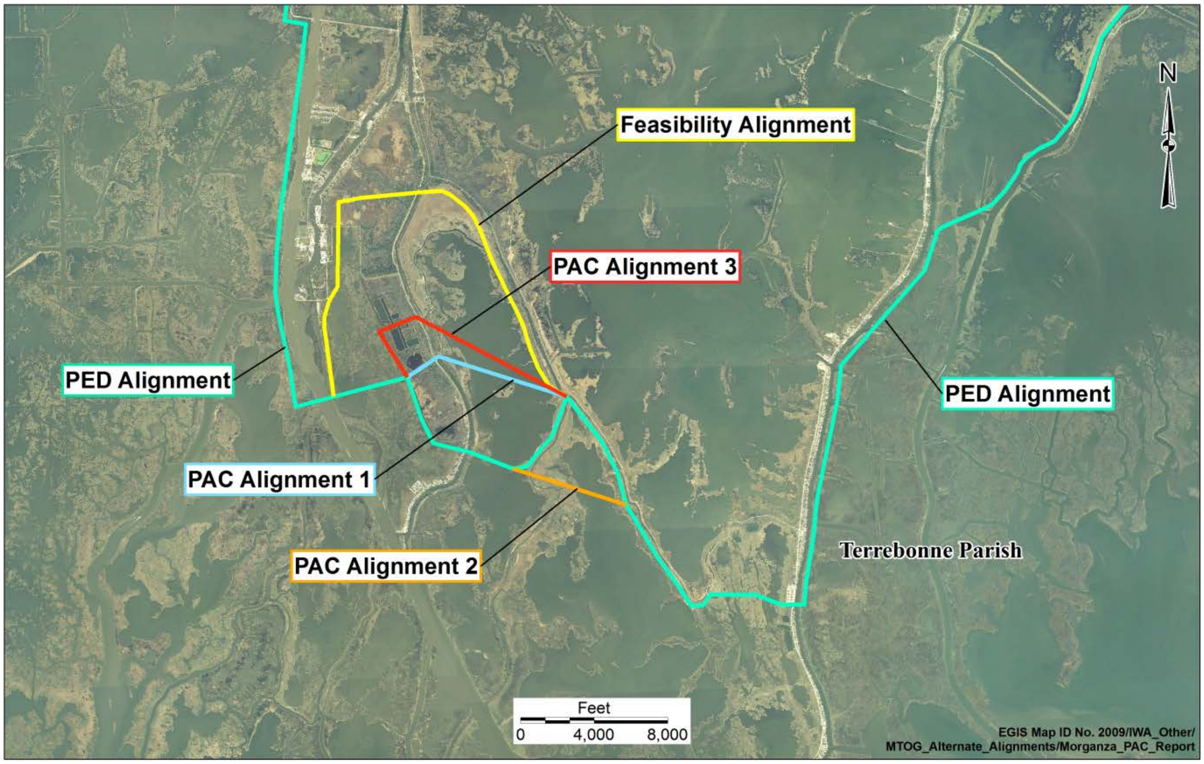


Figure 4-6. Alternative Alignments Analyzed for Reach G

The estimated project cost was compared for each alternative alignment as shown. Cost estimates included the cost of construction, real estate, and mitigation.

Environmental impacts were evaluated based on the amount of direct impacts to both marsh and bottomland hardwoods (wet and dry) due to the levee placement and the borrow pits. Costs for the mitigation were based on a ratio, not on habitat value. No indirect impacts were quantified at that time.

The feasibility alignment was screened out because it has the highest cost, highest direct impacts, and two known cultural sites within the alignment. The PAC2 option was selected as the preferred alternative because it is the most cost effective alternative. The PAC2 option presents a tradeoff between direct and potential indirect impacts. Of all the options, the PAC2 option would have the least direct wetland impacts, but would enclose the largest amount of marsh and open water. The National Marine Fisheries Service (NMFS) and the rest of the Habitat Evaluation Team are concerned about the potential for indirect impacts to marsh and fishery access to wetlands and Essential Fish Habitat on the protected side. The system wide modeling of environmental control structures shows that in the short term these indirect impacts could be minimal, but does not have the resolution at this time to describe impacts over time with various SLR scenarios. This analysis is being planned for the PED stage. It is acknowledged that under some scenarios these indirect impacts could be significant.

Reach H, Segments 2 and 3

In 2005, the TLCD performed an alternative alignments analysis for Reach H, segments 2 and 3. Agency representatives from USACE, USFWS and NMFS provided input on the analysis, which considered engineering feasibility, environmental impacts, and construction costs. The following four alignments were evaluated (Figure 4-7):

- The Existing Alignment from the 2002 feasibility report which follows the natural ridge,
- A Set Back Alignment, which moves the levee alignment away from the ridge,
- An Existing Alignment Cross Over, which follows the existing alignment from the south but then crosses over to the northeast to join Reach I, eliminating the need to improve the Bush Canal levee and associated pump station in Reach I.
- A Set Back Alignment Cross Over, which follows the setback alignment from the south but then crosses over to the northeast to join Reach I, eliminating the need to improve the Bush Canal levee and associated pump station in Reach I.

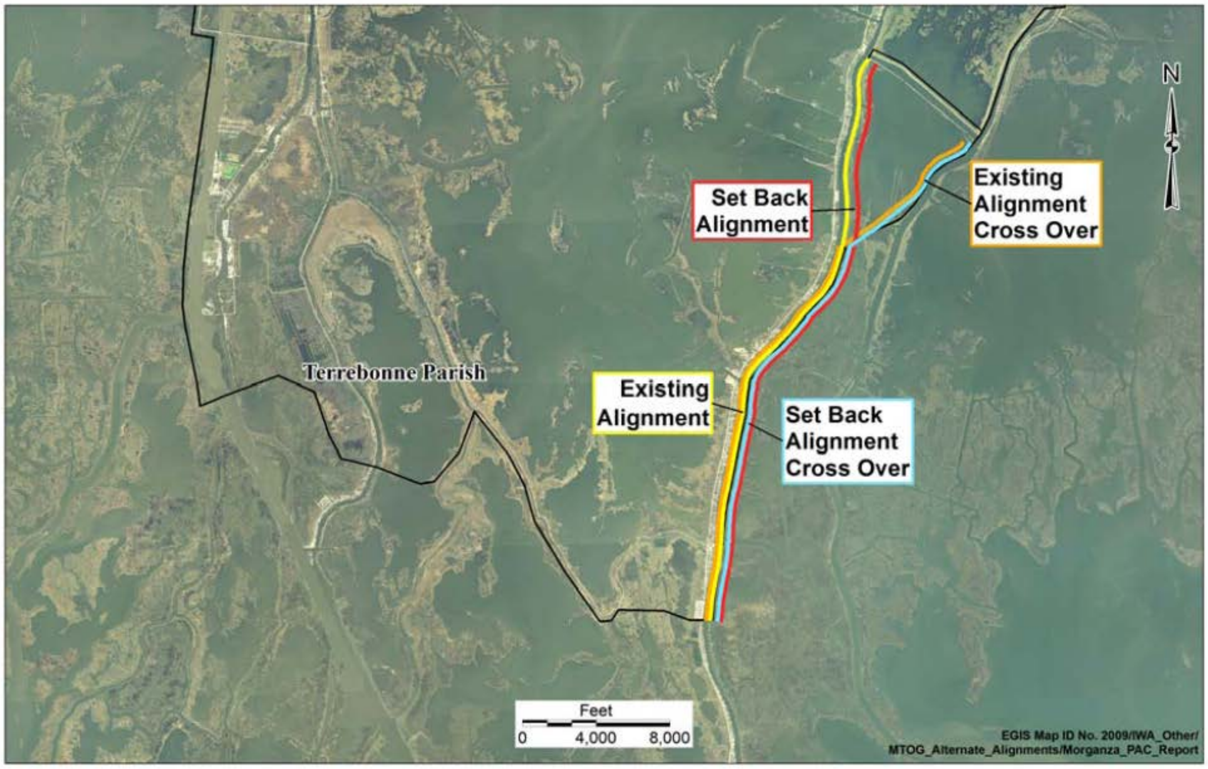


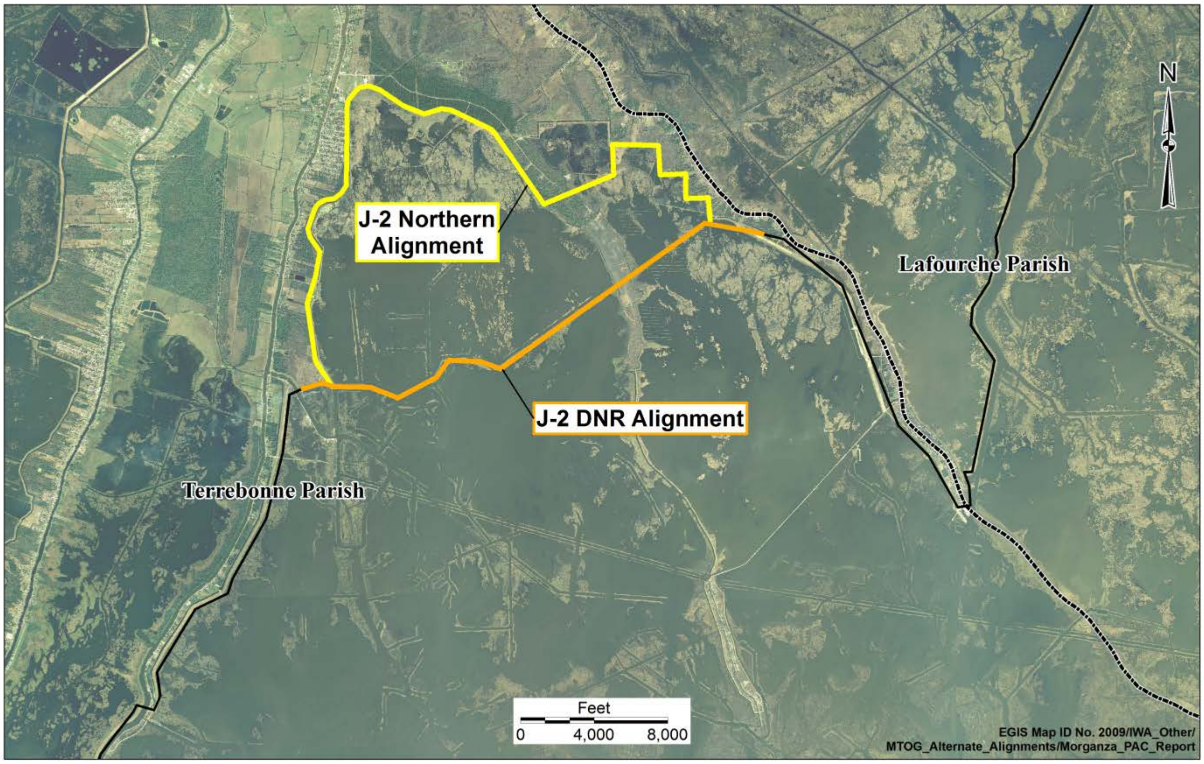
Figure 4-7. Alignments Analyzed for Reach H.

Additional alternatives were evaluated by combining the above alignments with different borrow material assumptions (for example, using fill material from adjacent borrow areas or fill material hauled-in from offsite sources). Using adjacent borrow material was found to be the most cost effective method.

The Existing Alignment Cross Over alternative was selected as the new alignment because it had the lowest total cost of all the alternatives, both with and without the Bush Canal savings. Therefore, based on both economic and environmental benefits, the team moved the alignment to its current location. The TLCD was granted a permit by USACE for reaches H-2 and H-3 on November 13, 2008.

Reach J, Segment 2

In 2004, the TLCD, in coordination with the USACE, performed an alternative alignments analysis of Reach J, Segment 2 (Figure 4-8). In the cost projections prepared for the 2002 feasibility report, the proposed hurricane levee was assumed to be located on natural levee soil landforms consisting of moderately strong to strong clays. However, an analysis of geotechnical and historic data indicated that as much as 70 percent of the J-2 alignment would be placed on landforms consisting of relatively deep peat layers, overlying weak clay deposits. The unanticipated soil conditions led to an increase in projected costs.



EGIS Map ID No. 2009/IWA_Other/ MTOG_Alternate_Alignments/Morganza_PAC_Report

Figure 4-8. Alternative Alignments Analyzed for Reach J2

As an alternative to the original J-2 alignment, the team evaluated an alignment following the existing Louisiana Department of Natural Resources (DNR) marsh restoration levee. The DNR alignment would shorten the total levee length by more than 20,000 feet, reduce direct wetland impacts from 345 acres to 83 acres, and eliminate bottomland hardwood impacts. Indirect impacts would be minimal because of the existing levees and structures associated with the J-2

DNR alignment's marsh management system. Additionally, the cost savings associated with the construction of the DNR alignment versus the construction of the original alignment were estimated at over $14 million because most of this levee alignment would be constructed on existing levees that would not require reinforced geotechnical fabric, sand base, or additional fill. For these reasons, this new alignment was chosen for Reach J-2. This was coordinated with LDWF refuge personnel.

Reach L

In October 2009, the USACE evaluated three alignment options for Reach L (Figure 4-9):

- L1: 5.4 miles of levee, two box culvert locations (authorized alignment)
- L2: 6.1 miles of levee, two box culvert locations
- L3: 6.1 miles of levee, one box culvert location

Each alternative would include one 56' sector gate with three 46' tainter gates and 6' by 6' box culverts at various locations. All earthen levees would be constructed of hauled-in material from off-site borrow sources.

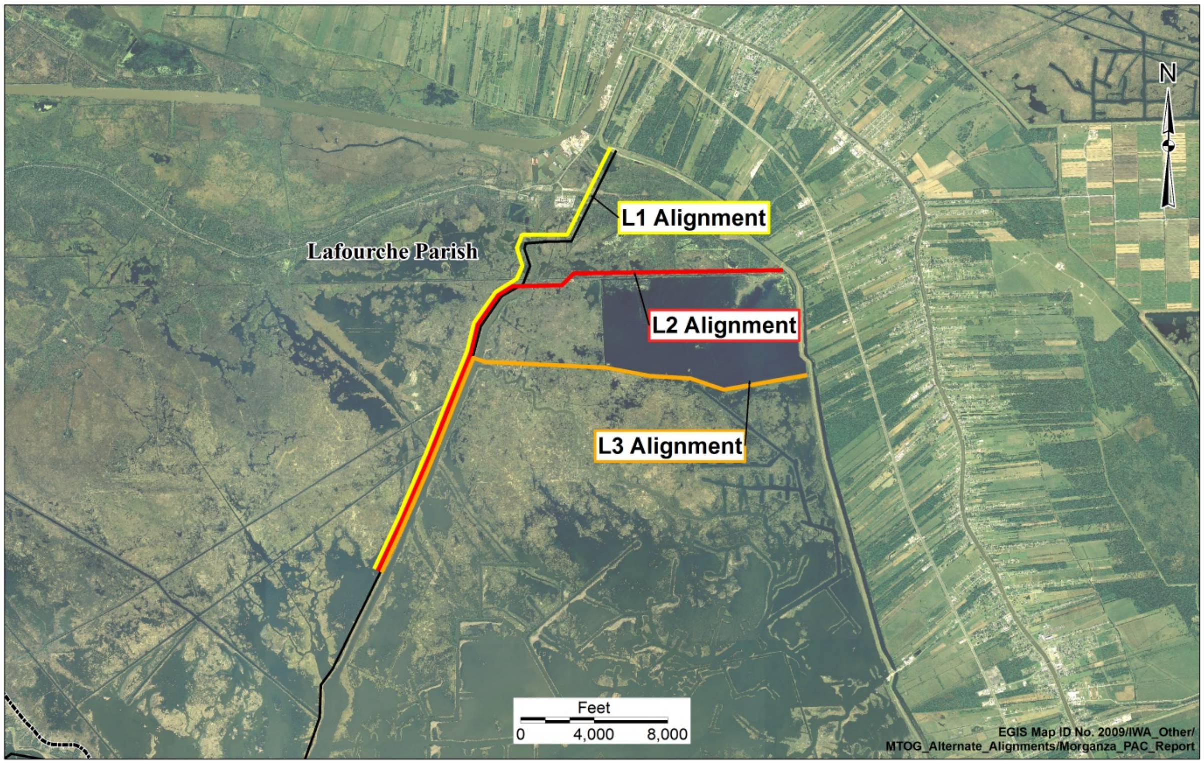


Figure 4-9. Alternative Alignments Analyzed for Reach L

Cost estimates included the cost of construction, real estate, and mitigation. Although Reach L3 is longer than the authorized alignment (L1), it would reduce the length of the existing Larose to Golden Meadow levee that would need to be raised resulting in an overall lower net cost. Environmental impacts were evaluated based on the amount of direct and indirect impacts to both marsh and bottomland hardwoods (wet and dry).

Option L3 was selected for the current alignment because it is the most cost effective alternative. As compared to the authorized alignment, this alignment would impact fewer acres of bottomland hardwood and marsh. Option A3 would enclose approximately 2,000 additional acres compared to the authorized alignment (A1), but box culverts would reduce any potential indirect impacts to water exchange.

Levee Extensions to the East: The alternative was extended on its eastern extent to address potential costs in the event that other previously proposed hurricane and storm damage reduction projects in the area are never authorized and/or constructed. The following reaches were added to the 77-mile TSP alignment, resulting in a longer 98-mile alignment (Figure 4-10 and the mapbook in Appendix G):

- Lockport to Larose Ridge - A 14-mile levee reach following an alignment formerly being proposed under the Donaldsonville to the Gulf feasibility study (Ridge alignment) and tying into Lockport, Louisiana. This reach would include two environmental control structures and three pump stations.

- Larose Section C-North Variant - A seven-mile levee reach following Larose to Golden Meadow sections C-North and E-1. Approximately 5,300 feet of existing T-wall would have to be removed and replaced or built adjacent to or on urban land. This reach would include one pump station and two floodgates.

4.3 Final Alternatives Considered in Detail

In addition to the No Action Alternative (4.1), the following alternatives have been evaluated in detail for comparison and plan selection. For further details on plan formulation, please refer to the PAC report.

- 1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative)—Proposed Plan (PP)
- 3% Annual Exceedance Probability Storm Surge Risk Reduction System (3% AEP Alternative)

Alternatives 1 and 4 brought forward from the 2008 analysis form the basis of the two final action alternatives under current consideration. Both share the same alignment for 98 miles (figures 4-10 and 4-11), which is based on the alignment chosen as the Recommended Plan in the 2002 feasibility study, but with the alignment modifications described above and extensions to the project. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with

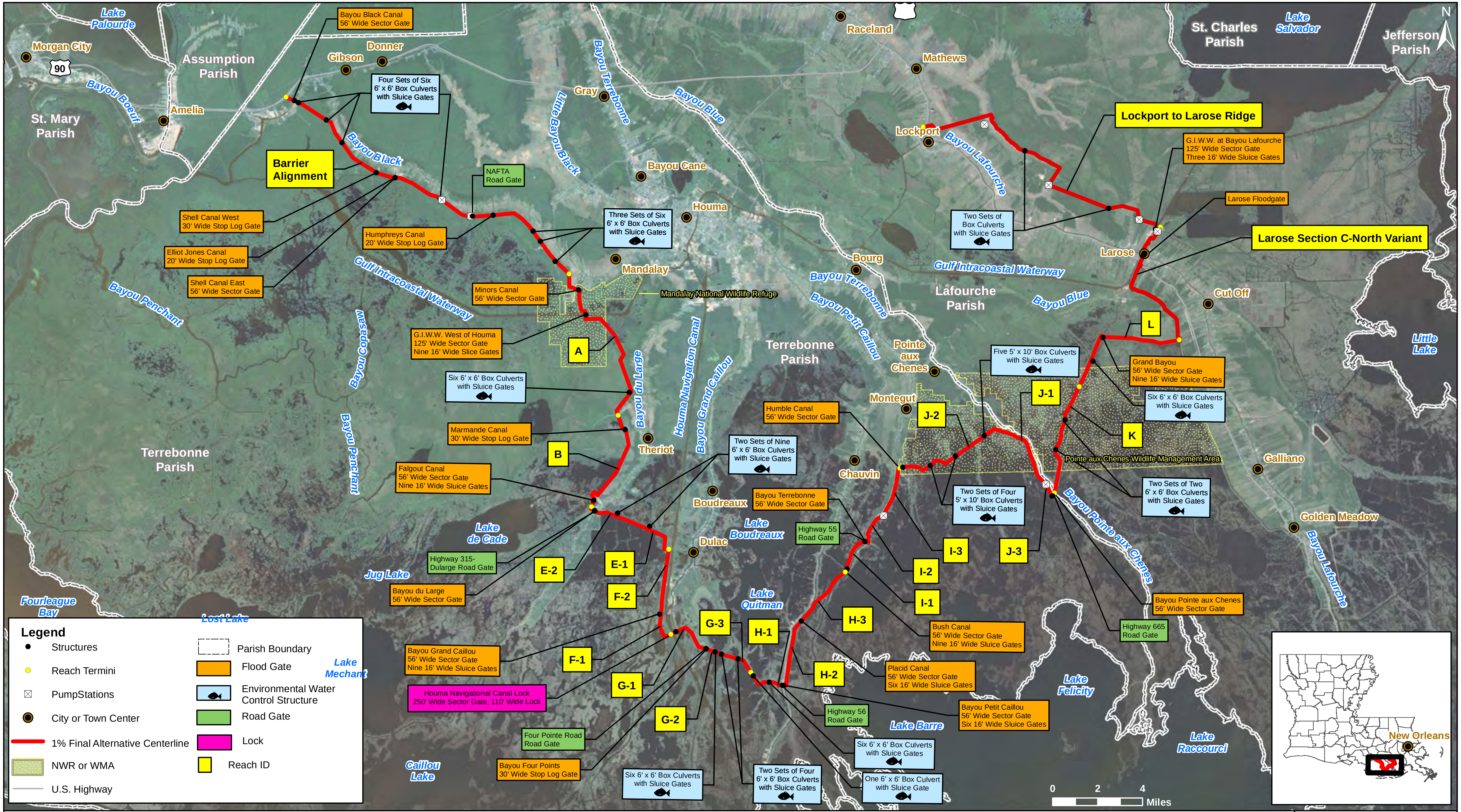


Figure 4-10. ALIGNMENT AND STRUCTURES OF THE 1% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE RISK REDUCTION SYSTEM ALTERNATIVE

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 4-10
Date: March 2013
Scale: 1:256,000
Source: USACE/GEC
Map ID: 273160010-2811

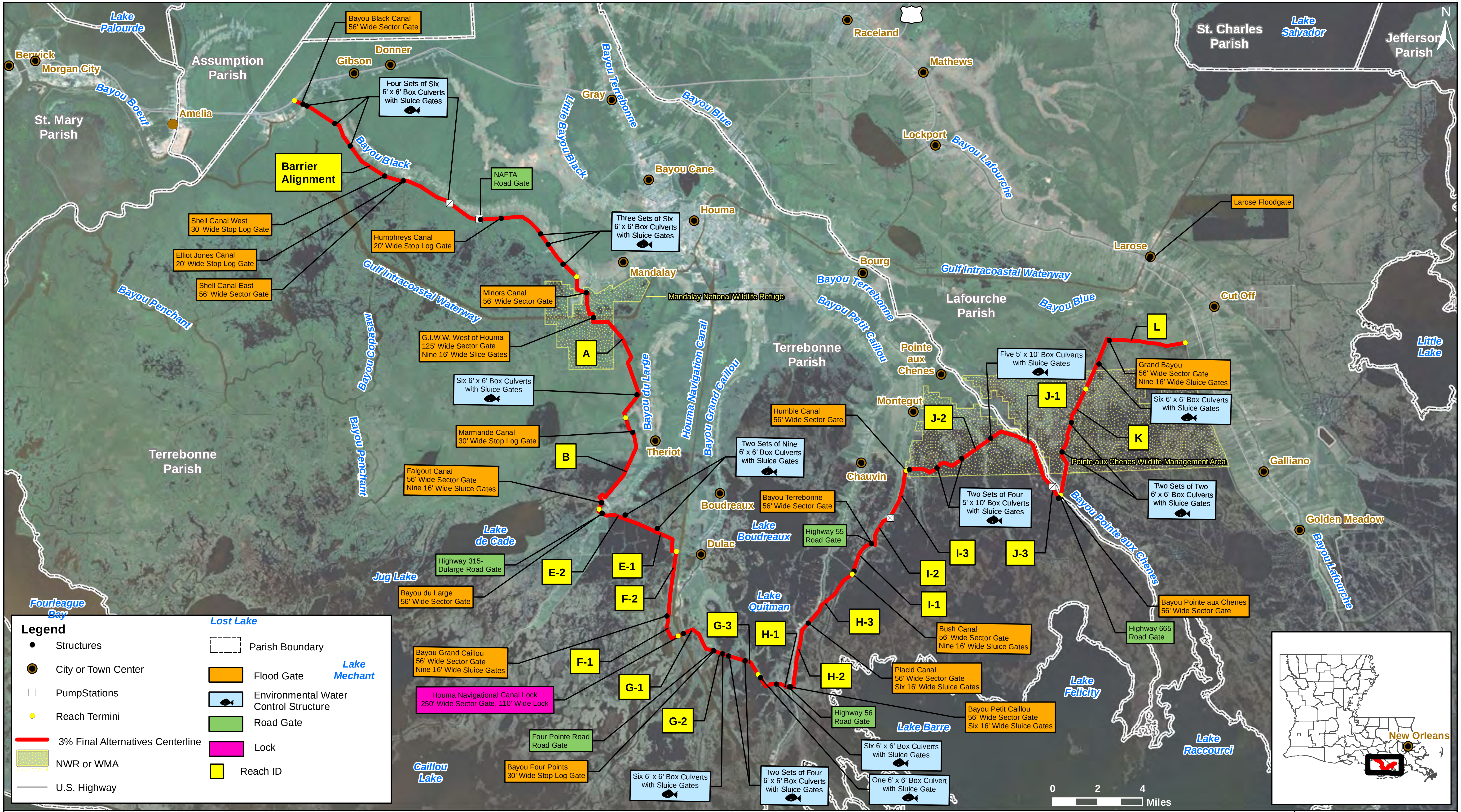


Figure 4-11. ALIGNMENT AND STRUCTURES OF THE 3% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE RISK REDUCTION SYSTEM ALTERNATIVES

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 4-11
Date: March 2013
Scale: 1:256,000
Source: USACE/GEC
Map ID: 273160010-3004

sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species.

Detailed maps of the alternatives are provided in Appendix G, “Maps of Final Alternatives”. Although this RPEIS is programmatic in nature, the following features of the action alternatives have sufficiently detailed designs to be fully assessed in this RPEIS, and would not require additional NEPA documentation. These features, termed “Constructible Features”, include levee reaches F1, F2, G1; the HNC Lock Complex; and the Bayou Grand Caillou Floodgate (Figure 4-10). The remaining components of the project are termed “Programmatic Features.”

4.3.1 1% AEP ALTERNATIVE

The 1% AEP Alternative is a hurricane levee system that provides risk reduction for water levels that have a 1 percent chance of occurring each year. This alternative is closely based on Alternative 1 (authorized alignment) from the 2008 analysis.

The levee system would extend from high ground along US 90 near the town of Gibson and tie into Hwy 1 near Lockport, LA in Lafourche Parish (Figure 4-10; detailed maps shown in Appendix G). Planned levee elevations range from 15.0 to 26.5 feet NAVD88. Toe-to-toe levee widths range from 282 feet to 725 feet. The direct impacts and wetland losses are calculated based on the Right-of-Way limits (include the levee footprint, the borrow canal and the widths of the offsets required for both levee stability and borrow pit stability) plus the extents of the proposed mitigation areas. The Right-of-Way limits and proposed mitigation areas are depicted in Appendix G. Twenty-two floodgates on navigable waterways, ranging in elevation from 17.0 to 33 feet (NAVD88), would be located on waterways throughout the levee system, including a lock complex on the HNC. Additionally, environmental water control structures would allow tidal exchange at 23 locations through the levee through sluice gates and box culverts (Figure 4-10 and Appendix G).

A total of nine road gates would be located at the following levee/road crossings: NAFTA, Four Pointe Road, Highway 315 (DuLarge), Highway 55, Highway 56, and Highway 665. Fronting protection would be provided for four pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), Hwy 24, Hwy 3235, Union Pacific RR, and Hanson Canal pump stations.

HNC Lock Complex: The HNC lock complex would consist of a 110-foot by 800-foot lock, an adjacent 250 foot-wide sector gate, and a dam closure that tie into adjacent earthen levees to reduce the risk of storm surge traveling up the HNC (Figure 4-12). Vessel traffic would pass through the sector gate portion of the structure for the majority of conditions. However, when the sector gates are closed, the lock would be used. The complex would be constructed as part of the Morganza to the Gulf of Mexico, Louisiana project but could also be operated for environmental purposes.

4.3.2 3% AEP ALTERNATIVE

The 3% AEP Alternative would provide risk reduction for water levels that have a 3 percent chance of occurring each year. This alternative is a modification of the 2008 analysis Alternative 4 (Recommended Plan from the 2002 feasibility study), which was based on outdated (pre-Katrina) storm and levee design standards for the 100-year level of risk reduction. To update this alternative to current risk reduction standards, a statistical analysis on each levee reach was performed after the 2008 report. This analysis did not produce a consistent level of risk reduction along the entire levee alignment. Return intervals varied from a low of 18 to 23 years (Reach L) to a high of 66 to 83 years (Reach A). Further statistical analyses determined that a 3 percent annual chance (35-year) surge most closely represents the current overall level of risk reduction for the 2002 authorized levee system. For the current study, the authorized project alternative was subsequently redesigned to represent a consistent 3 percent annual exceedance probability.

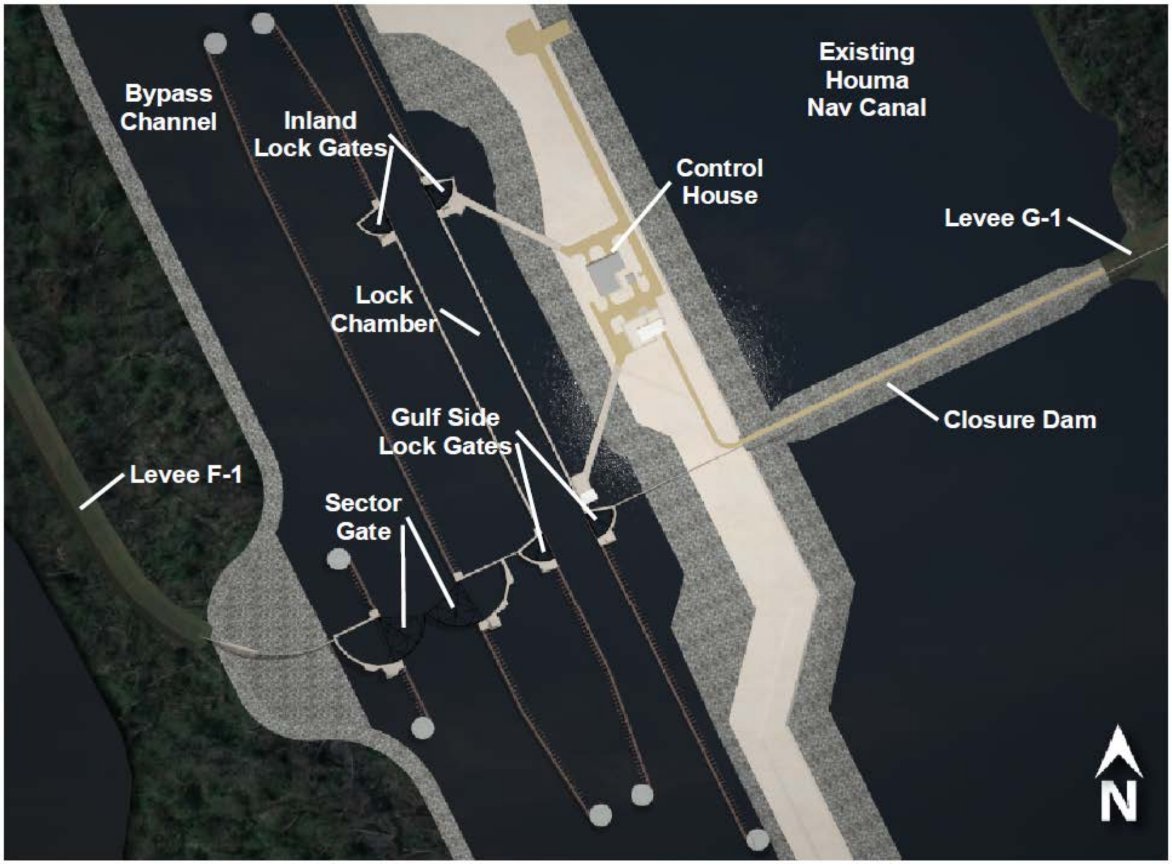


Figure 4-12. Houma Navigation Canal Lock Complex.

This alternative would have a similar alignment and structures as the 1% AEP Alternative (see above) but with levees and structures at lower elevations to meet post-Katrina 3 percent standards (Figure 4-11 and Appendix G). Planned levee elevations range from 12.0 to 20.0 feet NAVD88. Toe-to-toe levee widths range from 174 feet to 440 feet. Structures would range from elevation 14.0 to 25.0 feet NAVD88.

The levee alignment would be 98-miles long. It was found that the net benefits of this alternative would be lower than the net benefits of the 1% AEP Alternative.

4.3.3 SELECTED LEVEL OF RISK REDUCTION (1% AEP ALTERNATIVE)

The 1% AEP has been selected for the following reasons:

- **Higher net benefits**. According to WRDA Implementation guidance dated May 25, 2011, "recommendations in the PAC report should be made in consideration of maximizing excess benefits over costs." Both plans have positive benefit-cost ratios, but net benefits (excess benefits over costs) for the 1% AEP Alternative are higher than the net benefits of the 3% AEP Alternative.
- **Lower residual risk**. The 3% AEP Alternative has a higher probability of overtopping and/or levee breaches than the 1% AEP Alternative and therefore has higher residual damages than the 1% AEP Alternative.
- **More adaptable**. The 1% AEP structures would be constructed at higher elevations than the 3% AEP structures, which allows more flexibility to adapt to relative sea level rise in the future. Although the total cost of the 1% AEP Alternative is significantly higher than the 3% AEP Alternative, not all funding and expenditures are required up front since earthen levees would be constructed in multiple lifts.

4.3.4 LEVEE AND STRUCTURE DIMENSIONS TO ACCOMMODATE RELATIVE SEA LEVEL RISE

As described above, one main difference between the two final alternatives lies in the levee dimensions and structure heights related to the differing levels of hurricane risk reduction (tables 4-1 and 4-2).

Table 4-1. Comparison of Levee Reach Dimensions for the 1% and 3% AEP Alternatives

Levee Reach	Length (miles)	Authorized Elevation (NGVD)	Range of Levee Design Elevations Between 2035 and 2085 (ft NAVD88)		Maximum Levee Toe to Toe Width (ft)	
			3% AEP Alternative	1% AEP Alternative	3% AEP	1% AEP
Barrier	15.7	N/A	10 to 13	15.5 to 20	174	329
A	8.2	10.5	10 to 13	15.5 to 20.5	174	329
B	5.1	12	11.5 to 13.5	17.5 to 20.5	355	610
E	4.4	14	14.5 to 15.5	21.5 to 23.5	440	725

Levee Reach	Length (miles)	Authorized Elevation (NGVD)	Range of Levee Design Elevations Between 2035 and 2085 (ft NAVD88)		Maximum Levee Toe to Toe Width (ft)	
			3% AEP Alternative	1% AEP Alternative	3% AEP	1% AEP
F	4.1	14	14.5 to 15.5	22 to 23.5	270	490
G	5.8	15	16.5 to 17.5	22.5 to 24	270	550
H	7.9	15 to 16	18.5 to 20	24 to 26.5	330	500
I	5.7	14 to 15	18.5 to 20	24 to 26.5	319	570
J	9.3	14	18.5 to 20	24 to 26.5	337	660
K	5.1	12 to 14	16.5 to 17.5	22.5 to 25.5	400	635
L	5.9	10 to 11	16.5 to 17.5	22.5 to 25.5	400	635
Larose C-North	7.0	N/A	13.5 to 15.5	18 to 20.5	252	467
Lockport to Larose	12.6	N/A	8.5 to 12	10.5 to 15	282	282
Note the different datum for the authorized (NGVD) and current (NAVD88) elevations. The change in elevation due to datum differences varies by location, and is around 0.5 to 1.5 ft.						

Table 4-2. Comparison of Floodgate Elevations for the 1% and 3% AEP Alternatives

Reach	Waterway	Structure Design Size/Type (subject to change during detailed design)	3% AEP Design Elevation (ft)	1% AEP Design Elevation (ft)
Barrier	Bayou Black	56-ft sector gate	15.0	22.0
	Shell Canal West	30-ft stop log gate	16.0	23.5
	Shell Canal East	56-ft sector gate	16.0	23.5
	Elliot Jones Canal	20-ft stop-log gate	16.0	23.5
	Humphreys Canal	20-ft stop-log gate	16.0	23.5
A (north of GIWW)	Minor’s Canal	56-ft sector gate	16.0	23.0
A	GIWW West (at Houma)	125-ft sector gate with nine 16 ft sluice gates	16.0	23.0
B	Marmande Canal	30-ft stop-log gate	16.5	23.0
	Falgout Canal	56-ft sector gate	16.5	23.0
E-2	Bayou Du Large	56-ft sector gate	18.0	25.5
F-1	Bayou Grand Caillou	56-ft sector gate	18.0	25.5
G-1	HNC	250-ft sector gate and 110-foot by 800-foot lock	22.5	30.5

Reach	Waterway	Structure Design Size/Type (subject to change during detailed design)	3% AEP Design Elevation (ft)	1% AEP Design Elevation (ft)
G-2	Four Point Bayou	30-ft stop-log gate	22.5	30.0
H-1	Bayou Petit Caillou	56-ft sector gate	22.5	30.5
H-2	Placid Canal	56-ft sector gate	24.0	31.5
H-3	Bush Canal	56-ft sector gate	25.0	33.0
I-1	Bayou Terrebonne	56-ft sector gate	25.0	33.0
I-3	Humble Canal	56-ft sector gate	25.0	33.0
J-3	Bayou Pointe aux Chenes	56-ft sector gate	25.0	33.0
L	Grand Bayou	56-ft sector gate	21.0	29.5
Larose C-North	Bayou Lafourche	56-ft sector gate	14.0	17.0
	GIWW East (at Larose)	125-ft sector gate with three 16 ft sluice gates	17.0	21.5

The levee design heights, cost estimates, and benefit-cost ratios for the alternatives are based on the intermediate RSLR scenario of 2.4 feet. Since this project would be constructed over 40 or more years, the RSLR rates and associated levee heights may be updated in the future to reflect actual conditions. If over time it appears that the actual RSLR rate is higher than expected, additional lifts can be added to levees (adding to the cost of the project), and an additional NEPA document would be prepared. If RSLR rates are lower than expected, then final levee lifts would not need to be constructed (reducing the cost of the project).

Conversely, structures were designed to include two feet of structural superiority to accommodate the *high* RSLR scenario. If RSLR rates are lower than expected, the structures would remain overbuilt.

4.3.5 SPONSOR-FUNDED ADDITIONAL WORK ITEM

A sponsor-funded additional work item would involve deepening the HNC lock complex to -23 feet (NAVD88). This option could be implemented in anticipation of a proposal to deepen the HNC, which is the subject of an ongoing feasibility analysis currently being completed by the LADOTD.

Section 203 of the Water Resources Development Act of 1986 allows local sponsors to conduct feasibility studies at their own cost for navigation projects. The completed feasibility report would be submitted to the Assistant Secretary of the Army (Civil Works) for approval to be constructed as a Corps project. If approved, the project would require Congressional authorization and funding prior to actual construction. If the project is authorized and funded, the local sponsor would receive a credit toward construction costs, 50 percent of the feasibility study cost, and Independent External Technical Review costs.

Implementation of the sponsor-funded additional work item would alleviate the necessity of reconstructing the HNC Lock Complex should the HNC deepening project be authorized and funded. The environmental impacts of the HNC deepening project would be assessed in a separate NEPA document.

4.3.6 IMPACTS TO AREAS OUTSIDE PROPOSED RISK REDUCTION SYSTEM

Under the 2007 authorization, not all structures were included in the risk reduction system. Approximately 1,000 structures, in Isle de Jean Charles, Bayou Du Large and Bayou Grand Caillou, would remain outside of the risk reduction system.

Although areas south of the levee system would already receive damages under the without-project conditions, the action alternatives could increase these damages. The alternatives also have the potential to flank the western extent of the Barrier Reach, although this effect is less apparent from the storm surge modeling results. Based on post-Katrina surge modeling, the 1% AEP Alternative would increase water levels during storm events by approximately two to three feet over without-project conditions in areas immediately outside the risk reduction system.

At the current time, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project.

In order to prevent increased risk to people and structures, which are already located in high risk areas, a preliminary nonstructural compensation plan has been developed. Because of the vast scope of this project and the limited amount of available information at this time, each affected parcel could not be assessed individually to determine what the level of impact would be, and whether that impact would be categorized as a taking of property rights. A worst case scenario (most expensive option) was assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. Should this scenario prove to be the appropriate mitigation method, more than 2,500 people would need to be relocated to areas behind the Federal levee system.

The benefits and costs of the buy-out plan have been incorporated into the total project cost and benefits analysis. The buy-out plan increases equivalent annual benefits for the 3% and 1% AEP alternatives by approximately $39 million and $57 million, respectively. The total real estate cost associated with this acquisition is estimated to be approximately $305 million. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents.

Additional information on induced damages may be found in Section 6 of the PAC report.

4.3.7 INDUCED FLOODING IMPACTS

Given the modeling resolution at the time, the potential for induced flooding outside the levee was not identified in the 2002 feasibility report and DEIS, however, post-Katrina surge modeling results indicate that the project could increase water levels in areas immediately outside the risk reduction system during storm events. When comparing the results of the ADCIRC runs for the without-project to the with-project conditions for existing 1% AEP water levels, the with-project water levels under a storm event are approximately 2 to 3 ft higher. These areas would all ready be inundated during the storm. For more details please see section 6.5 of the PAC report.

Approximately 1,000 structures (approximately 876 residential) would remain outside of the Morganza to the Gulf risk reduction system. These areas include portions of Bayou Du Large, Bayou Du Lac and Gibson and all of Cocodrie and Isle de Jean Charles. Although areas outside the levee system would already receive damages under the without-project conditions, the alternatives could increase damages during some events. In order to prevent increased risk to people and structures, which are already located in high risk areas, a preliminary nonstructural plan has been developed. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buyout and uniform relocation assistance of all of the structures in the impacted areas. Should this scenario prove to be the appropriate mitigation method, approximately 2,500 people would need to be relocated to areas behind the Federal levee system. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents.

Modeling showed that the proposed project may also induce flooding (due to overtopping) south of the Larose Section C-North Variant Reach, on the west side of the Larose to Golden Meadow levee (Figure 4-13: shown with a dashed line). This levee would need to be raised approximately one to three feet to bring it up to a level of risk reduction comparable to the proposed Morganza project. If Congress does not re-authorize and fund improvements to the Larose to Golden Meadow ring levee, the costs to raise the levee and mitigate for any impacts, currently estimated at $166 million, would be covered by the Morganza to the Gulf project. As a worst-case scenario, these costs are included in the 1% AEP Alternative costs.

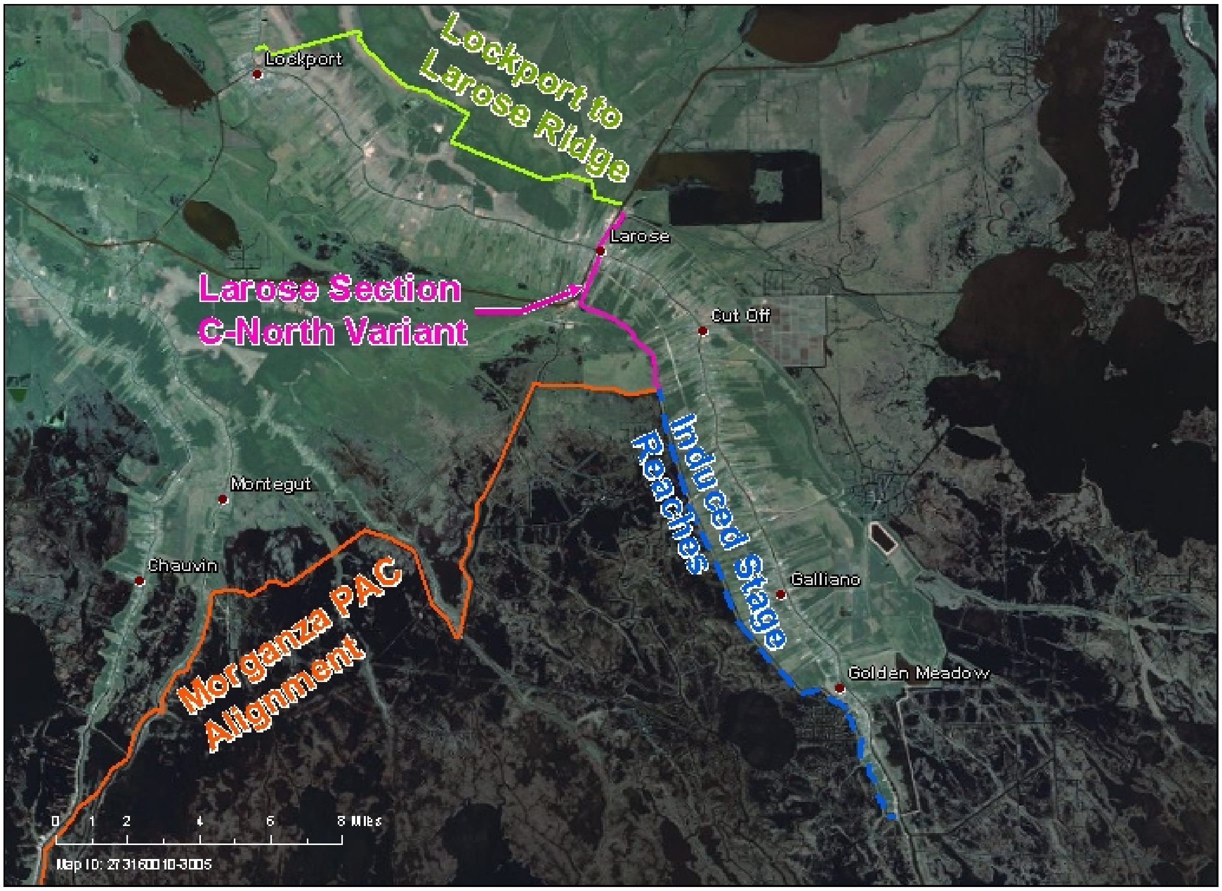


Figure 4-13. Area of Potential Induced Flooding of Larose to Golden Meadow Ring Levee.

4.3.8 OPERATION OF STRUCTURES

The following sections describe the operation plan for the HNC lock complex, GIWW floodgates, other floodgates, and environmental control structures. Table 4-3 shows the flood closure criteria for all structures. The HNC lock/floodgate complex also has a salinity trigger which is described below the table. The environmental control structures would be used for drainage of isolated areas within a certain timeframe and maximum inundation of the marsh areas. Refer to the H&H appendix for more details.

Table 4-3: Morganza to the Gulf of Mexico, Louisiana Water Control Structure Operations Plan - Flood Closure Criteria

The following group of structures…	…cannot be closed until the following conditions are met:	…and can only be re-opened if the following conditions are met:

Group 3: Marmande Canal Bayou Dularge Falgout Canal Bayou Petite Caillou Bayou Terrebonne Humble Canal Grand Bayou Bayou Pointe Aux Chenes Placid Canal Bush Canal	1. A named storm is in the Gulf and threatening the Louisiana coast, OR The stage measured at the gate location reaches +2.5 ft NAVD88.	1. Stages on the outside of the structures drop below +2.5 ft NAVD88, AND 2. The NHC small craft advisory no longer applies to the area and the channel has been cleared of obstructions so that navigation can safely resume.
Group 4: ECS in Reaches E	These structures are flap gates that allow for continuous one way flow/drainage.	
Group 5: ECS #1 (existing) and #2 (existing) in Reach J	These structures would be managed according to current LA Wildlife and Fisheries Permit.	According to current LA Wildlife and Fisheries Permit.

Note: The following operation plans are preliminary for the purpose of assessing potential adverse indirect impacts of the proposed Federal project. Operation plans would be further refined during Preconstruction Engineering and Design and in future NEPA documents.

Group 1 contains the constructible features; all other groups contain programmatic features.

No structure can be closed or re-opened when the pressure head differential exceeds the structure design capability. No structure can be re-opened until storm force winds have dropped to a level safe for personnel to access the area and operate the machinery.

[1] An announcement that tropical-storm conditions are possible within the specified area (includes tropical depressions). Because outside preparedness activities become difficult once winds reach tropical storm force, watches are issued 48 hours in advance of the anticipated onset of tropical-storm-force winds.

NHC = National Hurricane Center. ECS = Environmental Control Structure

4.3.8.1 Operation of HNC Lock Complex for Salinity control

The primary purpose of the Houma Navigation Canal (HNC) lock and floodgate structure is for storm surge control (see Table 4-3 above). Secondary benefits include prevention of saltwater intrusion from impacting drinking water quality at the Houma Water Treatment Plant, and protection of marsh areas inside the system along the HNC channel by reducing salt water intrusion. A lock is being built as a feature of the hurricane, storm damage risk reduction project in order to address impacts to navigation as a result of the operation of these features for project purposes. The lock operation plan has two triggers based on the two purposes. First, maintaining a safe water elevation in the channel for storm control and navigation, and second, controlling chloride levels at the Houma Treatment Plant and controlling salinity to protect environmental habits upstream of the structure.

The HNC lock and floodgate would be closed for salinity control only if:

1. Flows in the Atchafalaya River flows are below 100,000 cfs as measured on the Simmesport gage (USGS 07381490 Atchafalaya River at Simmesport, LA) or
2. If a gage on the outside of the HNC Lock complex exceeds a salinity value that has been correlated with preventing exceedance of the maximum allowable chloride level of 250 ppm as defined in EPA’s secondary drinking water standard at the Houma Treatment Plant. The structure should be closed for at least 12 hrs and fluctuations in chloride levels should be monitored and recorded hourly. This to be determined salinity value at the new gage should correlate with the value of 7.5 ppt measured at the HNC at Dulac monitoring station. The 7.5 ppt trigger would be used to perform the indirect impact analysis in this document. Once the new trigger is established the impact analysis would be redone to verify the assumptions made.

The HNC lock complex may be opened when all of the following additional criteria have been met (The lock may be used for navigation, as soon as the hurricane and small craft warning no longer apply to the project area, and the channel has been cleared of obstructions. This may occur before the next two criteria are met)**:**

1. The differential between the interior water level and exterior water level is equal to or less than the +1.0 feet as measured on the upstream and downstream staff gage respectively.
2. After monitoring chloride levels over the 12 hour period at the new gage on the outside of the HNC Lock complex drops below the salinity closure trigger described above. For the analysis of indirect impacts a salinity level of 13 ppt as measured near Cocodrie (LUMCON Station) would be used. The LUMCON station replaces the Bayou Grand Caillou USACE 76305 from the 2002 feasibility report because it has a more robust dataset. If the USACE re-evaluates the salinity trigger at the LUMCON station and comes up with a trigger different than 13ppt, this trigger may change. Once the new trigger is established the impact analysis would be redone to verify the assumptions made.

In order to operate the HNC lock according to the criteria laid out in this plan, a monitoring program must be included in the O&M manual and in place.

Table 4-4. Number of Gate Closures Between 2001 and 2012

Gate	Total Number of Closures from 2001 to 2012	Maximum Number of Closures Per Year
Bayou Terrebonne	45	8
Little (Petit) Caillou	29	9
Lower Bayou Du Large	5	2
Upper Little Caillou Barge	4	1
Humble Canal	9	5

Source: Terrebonne Levee and Conservation District

4.3.8.2 Adapting Operation Plans to Future Conditions

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 would need to be re-evaluated periodically and closure trigger elevations may need to be increased if significant sea level rise occurs.

In the future, the non-Federal sponsor may desire more frequent closure of structures to reduce damages from higher stages unrelated to storm events, however, that operational purpose is not covered by the RPEIS for this PAC report. In the event that the project purpose and operation of structures changes in the future, impacts to navigation and development could be reduced by adding a second set of gates to turn floodgates into locks in conjunction with additional pumps behind the levee system. If these changes in operation are requested in the future, a supplemental NEPA document and additional PAC report would be required.

After the HNC lock complex is constructed as part of the Morganza to the Gulf project, the lock could also be operated for ecosystem restoration purposes, such as distribution of freshwater. Proposed operational changes for LCA ecosystem restoration purposes, and associated impacts, are documented in the *Final Integrated Feasibility Study and Environmental Impact Statement for the Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock* (USACE, 2010). For the multipurpose operation to occur, the LCA project would need an OMRR&R plan that considers operation of the lock beyond the current authorization of the Morganza to the Gulf project. By letters dated August 20, 2012 and October 16, 2012 the State formally notified USACE of the State's path forward for the LCA program. The HNC Lock Complex that provides for inland waterway transportation is a Federal responsibility for OMRR&R. Any changes to the operation plan would have to be coordinated with USACE and would potentially require a supplemental NEPA document

4.3.9 MITIGATION

Bottomland hardwood forest, swamp, fresh marsh, intermediate marsh, brackish marsh, and saline marsh habitats would be adversely impacted by construction of the overall project (e.g. programmatic and constructible project features). Approximate acres of direct habitat impacts associated with both the constructible features (Figure 4-10) and the programmatic features have been determined. Results are presented in tables 6-1 and 6-2.

The constructible project features would result in direct and indirect adverse impacts to intermediate marsh and brackish marsh habitats, plus it would result in indirect adverse impacts to fresh marsh and saline marsh habitats. The net loss of average annual habitat units (AAHUs) that would result from these impacts has been determined using the Wetland Value Assessment (WVA) methodology. The results for are presented in Appendix K, *Wetland Mitigation Plan for Constructible Features*, based on impacts associated with constructible elements of the 1% AEP alternative. The detailed WVA report is located in Appendix F.

Potential indirect habitat impacts that could result from construction of the programmatic project elements have not been determined at this time. This discussed further in Section 6.19.5.

To offset wetland habitat losses associated with the constructible project elements, coastal marsh habitats would be restored (created) as compensatory mitigation for either the 1% or the 3% AEP alternatives, depending on which is alternative is implemented. Appendix K contains the proposed mitigation plan for mitigating direct and indirect wetland impacts based on the constructible elements of the 1% AEP alternative. This plan is also briefly addressed in Section 6.19.4.

A proposed mitigation plan to compensate for direct and indirect habitat impacts associated with the programmatic project elements has not been developed at this stage. Potential alternatives for mitigating these impacts are discussed in Section 6.19.5.

4.3.10 IMPLEMENTATION SCHEDULE

Project construction is expected to take place over a range of years starting in 2015. The implementation schedule has not been constrained based on any funding stream assumptions or constraints. The schedule assumes completion to base year design elevations by year 2035 with final lifts completed by 2071. Because anticipated sea level rise and land subsidence between 2035 and 2085 would increase elevations necessary to provide appropriate levels of protection, levees would be constructed to remain above the target elevations during the period of analysis. For more information see section 6.3 of the associated PAC report.

4.4 Comparison of Environmental Consequences of Alternatives

Table 4-4 compares the environmental impacts of the No Action and action alternatives. The significant resources are individually described in Section 5 of this environmental impact statement, and the impacts of each alternative plan on each significant resource are detailed in Section 6. More details on the methods used to evaluate alternatives and the evaluation results, including costs, can be found in the PAC report.

Table 4-5. Comparative Impacts of Alternatives

Significant Resource	No Action	1% AEP Alternative	3% AEP Alternative
Wetlands	Most of the study area would lose vegetated wetlands. Salinity regimes would likely move northward, converting fresh and intermediate marshes. High subsidence rates, salinity and erosion associated with southeasterly winds and tropical storms may convert most of the marshes to open water within 20 to 40 years.	More than 3,000 acres of vegetated wetlands would be destroyed by project features. These losses would be compensated through the restoration of vegetative wetlands in the project area. There is a potential for adverse indirect and cumulative impacts to wetlands due to increased frequency and duration of water control structure closures in the future due to increase in sea level compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	More than 2,500 acres of vegetated wetlands would be displaced by project features. These losses would be compensated through the restoration of vegetative wetlands in the project area.
Prime and Unique Farmland	Hurricane and tropical storm tidal surges would continue to cause damage to prime farmland.	More than 400 acres of prime farmland would be directly affected by construction and 53 acres incorporated into mitigation areas.	Approximately 234 acres of prime farmland would be directly affected by construction and 32 acres incorporated into mitigation areas.

Aquatic Resources	The project area is likely to convert from a mainly estuarine habitat to a predominately marine habitat.	Direct effects include loss of open water habitat through conversion to project features, temporary habitat disruption due to construction. Habitat conversion may occur from hydrologic alteration. Long-term maintenance of existing habitats would result. There is a potential for adverse indirect and cumulative impacts to aquatic resources due to increased frequency and duration of water control structure closures in the future compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	Indirect and cumulative impacts would generally be similar to the 1% AEP but direct effects would involve a smaller area.
Fisheries	Continued land loss, conversion of habitats, sea level change, and increased storm intensity in the project area are expected to lead to a net decrease in coastal habitats supporting fisheries.	Direct impacts could result from the construction of levees, water control structures. Indirect impacts include continued loss of coastal habitats supporting fisheries. There is a potential for adverse indirect and cumulative impacts to fisheries due to increased frequency and duration of water control structure closures in the future do to RSLR compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	Indirect and cumulative impacts would generally be similar to the 1% AEP but direct effects would involve a smaller area.

Essential Fish Habitat	Continued land loss, conversion of habitats, sea level change, and increased storm intensity in the project area are expected to lead to a net decrease in EFH.	Direct impacts could result from the construction of levees, water control structures. Indirect impacts include continued loss of EFH. There is a potential for adverse indirect and cumulative impacts to fisheries due to increased frequency and duration of water control structure closures in the future compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	Indirect and cumulative impacts would generally be similar to the 1% AEP but direct effects would involve a smaller area.
Wildlife	Wildlife abundance is expected to decline due to the ongoing conversion of marsh to open water and subsidence of forested habitat.	Construction of levee, structures, and other features would convert wetland and open water habitat to uplands and project features. Indirect impacts would include creation, restoration, and protection of wetland habitat used for nesting, rearing of young, resting, and foraging activities.	Results would be similar to the 1% AEP Alt except for fewer acres converted to levees and project features.
Threatened and Endangered Species	The project area is expected to continue to lose estuarine wetland habitats used by T&E species for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements.	No direct impacts on T&E species. The project would partially offset the loss of coastal habitats thereby benefiting T&E species dependant on these habitats.	Effects would be similar to those described for the 1% AEP Alt.
Noise	No effects on noise levels are expected.	Any effects would be temporary and localized.	Same as 1% AEP Alt
Air Quality	No effects on air quality	Any effects would be temporary and localized.	Same as 1% AEP Alt

Hydrology	Amounts of Atchafalaya River water would increase. Greater areas of open water would form in marsh areas leading to higher storm surges in developed areas.	Within the levee, normal water/land interface would remain as it was pre-project. If structures are properly operated, the proposed levee system would have a minimal effect on the global salinity values, but could be used to reduce the salinity on the inside of the system.	Same as 1% AEP Alt
Water Quality	Water quality for the study area is expected to remain similar to current conditions. It is most likely that the average number of days annually exceeding the EPA chloride standard would remain relatively constant.	Levees would provide barriers to saltwater impacts from storms and long-term saltwater intrusion in the short term. There is a potential for adverse indirect and cumulative impacts water quality due to increased frequency and duration of water control structure closures in the future compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	Same as 1% AEP Alt
Hazardous, Toxic, and Radioactive Waste	No effects on HTRW are expected.	It is unlikely that HTRW would alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large.	Same as 1% AEP Alt

Socioeconomics	Risks and effects of hurricane and storm damages would continue to affect socioeconomic resources.	Displacement of approximately 10 housing units and temporary effects and disruptions of socioeconomic resources near construction sites. Indirect impacts include increased risk reduction from hurricane and storm events. The project may raise water levels outside the levees by several feet during storm events. For the PAC and this RPEIS, the USACE has assumed a worst-case compensation scenario, a 100% buy-out of all of the structures outside of the project alignment. Should this scenario prove to be the appropriate action, all residents located outside of the project alignment would be relocated to areas behind the federal protection system. There is a potential for adverse indirect and cumulative impacts to navigation due to increased frequency and duration of water control structure closures in the future depending on RSLR compared to without project conditions. The potential are unknown at this time but under some scenarios, these impacts could be significant.	Approximately 7 housing units displaced; otherwise same as 1% AEP Alt

Cultural Resources	Flooding due to storm events would erode landmasses containing cultural resources; this impact is permanent and its severity is based on the duration of the storm event. Adverse impacts would result from continual incremental loss of natural ridges that hold both known and potential unknown cultural resources due to sea level rise, subsidence and erosion.	The construction of the levee system may directly adversely impact any cultural resource that lies in the foot print of the system , its associated borrow or mitigation areas. Potential direct positive impacts result to areas protected by the proposed hurricane and storm damage risk reduction system.	Impacts would generally be similar to the 1% Alternative.
Recreation	By taking no action, continued saltwater intrusion, storm surge inundation and wetland and shoreline erosion and associated wetland fragmentation and conversion to open water would likely continue in the study area with negative impacts on recreation resources.	There would be no direct impacts to recreational facilities, as the proposed levee alignment avoids these features. An expanded levee system would have beneficial and detrimental effects on recreation. Indirect impacts include positive benefits to recreation.	Impacts would generally be similar to the 1% Alternative.
Aesthetics	Resources could be temporarily impacted by storms reducing accessibility to the Wetland Cultural Byway. Adverse indirect impacts to visual resources in the study area would be due to the incremental loss of wetlands and the natural ridges due to sea level rise, subsidence and erosion.	Visual resources may be directly adversely impacted by levee construction. Visual resources may be positively impacted due to an enhanced hurricane and storm damage risk reduction system.	Impacts would generally be similar to the 1% Alternative.
Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.			

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5. AFFECTED ENVIRONMENT

The President's Council on Environmental Quality (CEQ) regulations (40 CFR Part 1500 *et seq*.), promulgated to implement NEPA; provide guidance for the preparation of environmental impact statements. Section 1502.15 of the CEQ regulations provides direction for preparing the Affected Environment section and states that this section shall contain data and analysis "commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced."

This section provides a general overview of the environmental setting of the study area, and then describes the significant resources that may be affected by the project, including: vegetation, with an emphasis on wetlands; prime and unique farmland; aquatic resources; fisheries; essential fish habitat (EFH); wildlife; threatened and endangered species; noise; air quality; hydrology; water quality; socioeconomics; recreation; aesthetics; cultural resources; and hazardous, toxic, and radioactive waste (HTRW). A resource is considered significant if it is recognized by laws, regulations, or Executive Orders, or if it is recognized as important by stakeholders.

5.1 Environmental Setting of the Study Area

5.1.1 DESCRIPTION OF THE WATERSHED

The study area is situated within the Barataria-Terrebonne estuary (Figure 5-1). This estuary extends from the west bank levees of the Mississippi River (north and east), to the East Guide Levee of the Atchafalaya River (west), to the Gulf of Mexico (south), and to the town of Morganza (north). The Barataria Basin covers about 1,551,800 acres while the Terrebonne Basin covers an area of about 2,063,500 acres. The study area lies at the southern end of the Terrebonne Basin and contains a complex of habitat types, including natural levees, lakes, swamps, marshes, and bayous formed from sediments of abandoned Mississippi River deltas. Elevations in the study area vary. Near Houma, the largest city in the area, the elevation is approximately 10 feet (NGVD 88). The elevation along the bayou ridges is four to five feet (NGVD 88) and less than one foot (NGVD 88) along the southern portion near the Gulf of Mexico.

The major waterways located in the study area or that influence the study area include the Atchafalaya River, Bayou Black, Bayou du Large, Bayou Grand Caillou, Bayou Petit Caillou, Bayou Terrebonne, Bayou Pointe aux Chenes, Bayou Lafourche, and Bayou Blue (Figure 3-1). There are no scenic streams in the study area designated under the Louisiana Natural and Scenic River System. The HNC runs north and south mainly between Bayou du Large and Bayou Grand Caillou. The GIWW traverses the northern portion of the study area from east to west. Other significant features located within the study area include Lake Boudreaux and Lake Quitman, located south of Houma between Bayou Grand Caillou and Bayou Petit Caillou. In addition to these major water features, hundreds of smaller natural bayous and manmade canals are located within the study area.

The major waterways divide the study area into three main subbasins of the Terrebonne Basin (Figure 5-2). The Verret subbasin lies north of Bayous Boeuf and Black, and west of Bayou Terrebonne. The Verret subbasin is dominated by fresh water from the Atchafalaya River and Atchafalaya Bay. The Penchant subbasin is located between the Atchafalaya River and Atchafalaya Bay to the west and Bayou du Large to the east and is partly within the study area. The Gulf of Mexico forms its southern boundary and the natural ridge along Bayou Black demarcates its northern extreme. It is heavily influenced by flood flows from the Atchafalaya River. The Timbalier subbasin is located between Bayou du Large on the west, Bayou Lafourche on the east, the GIWW on the north, and the Gulf of Mexico to the south. The Timbalier subbasin has very limited fresh water inflow coming from rainfall and occasional high flows from the Atchafalaya River via the GIWW to the HNC and Grand Bayou Canal. The Fields subbasin is found between Bayou Lafourche to the northeast, Bayou Terrebonne to the west and northwest, and the GIWW to the south. This subbasin has the least variety of wetland habitat types of the three subbasins, containing mostly fresh marsh and swamp.

Several LCA projects authorized by WRDA 2007 are located within the Morganza study area, including but not limited to: (1) Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (2) Modification of Davis Pond Diversion and (3) Land Bridge between Caillou Lake and Gulf of Mexico. By letters dated August 20, 2012 and October 16, 2012, CPRAB has notified the Corps that it desires to suspend study and design on these projects. The decision of CPRAB to suspend these projects results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA.

5.1.2 LAND USE/LAND COVER

Data from the U.S. Geological Survey (USGS) National Land Cover Database (2006) for the study area reveal that 50 percent of the study area is emergent herbaceous wetlands (Table 5-1 and Figure 5-3). The marsh habitat in the study area transitions from fresh marsh in the more northerly portions to intermediate and brackish marshes, and to saline marsh near the coast. The remaining wetlands consist mainly of woody wetlands (primarily bald cypress/tupelo swamps and bottomland hardwood forest), which comprise about 14 percent of the study area.

Open water comprises a majority of the remaining land use (about 23 percent), and includes the Atchafalaya River and numerous bayous and drainage canals. Navigation canals include the GIWW and the HNC.

Only about 12 percent of the study area has been developed. Cultivated crops, which mainly include sugar cane, occupy about 5 percent of the study area. Residential and commercial land is located on only slightly more than 4 percent of the area. Population centers include Thibodaux and Shriever in northern Terrebonne Parish; the city of Houma; Donner and Gibson in western Terrebonne Parish; Chauvin, Dulac, and Montegut in southern Terrebonne Parish; Raceland, Lockport, and Pointe aux Chenes in Lafourche Parish; and the other population centers shown in Figure 3-1.

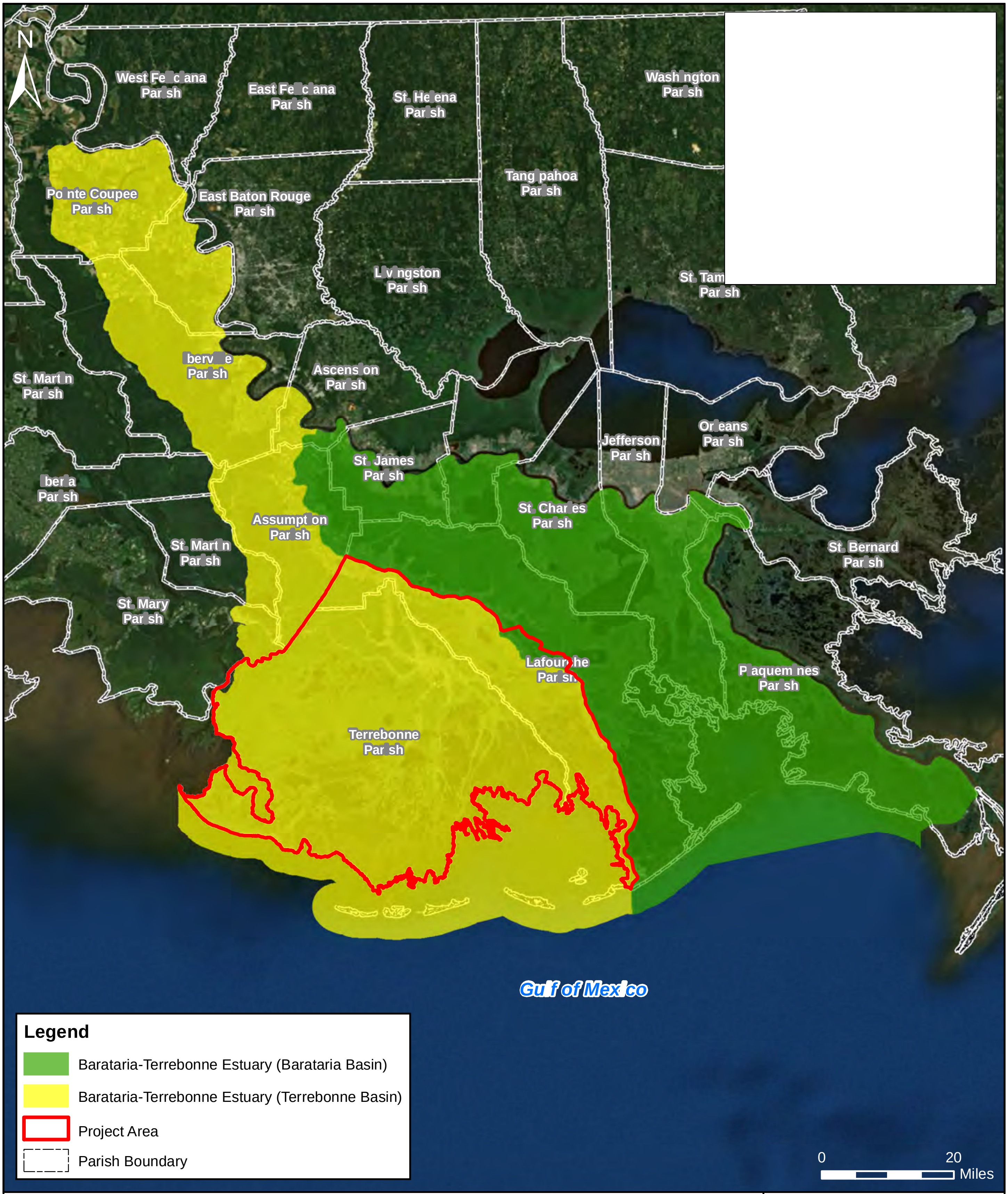

Figure 5-1. Barataria-Terrebonne Estuary

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

Gulf Engineers & Consultants

Figure: 5-1
Date: June 2012
Scale: 1:1,280,000
Source: USGS/GEC
Map ID: 273160010-3004

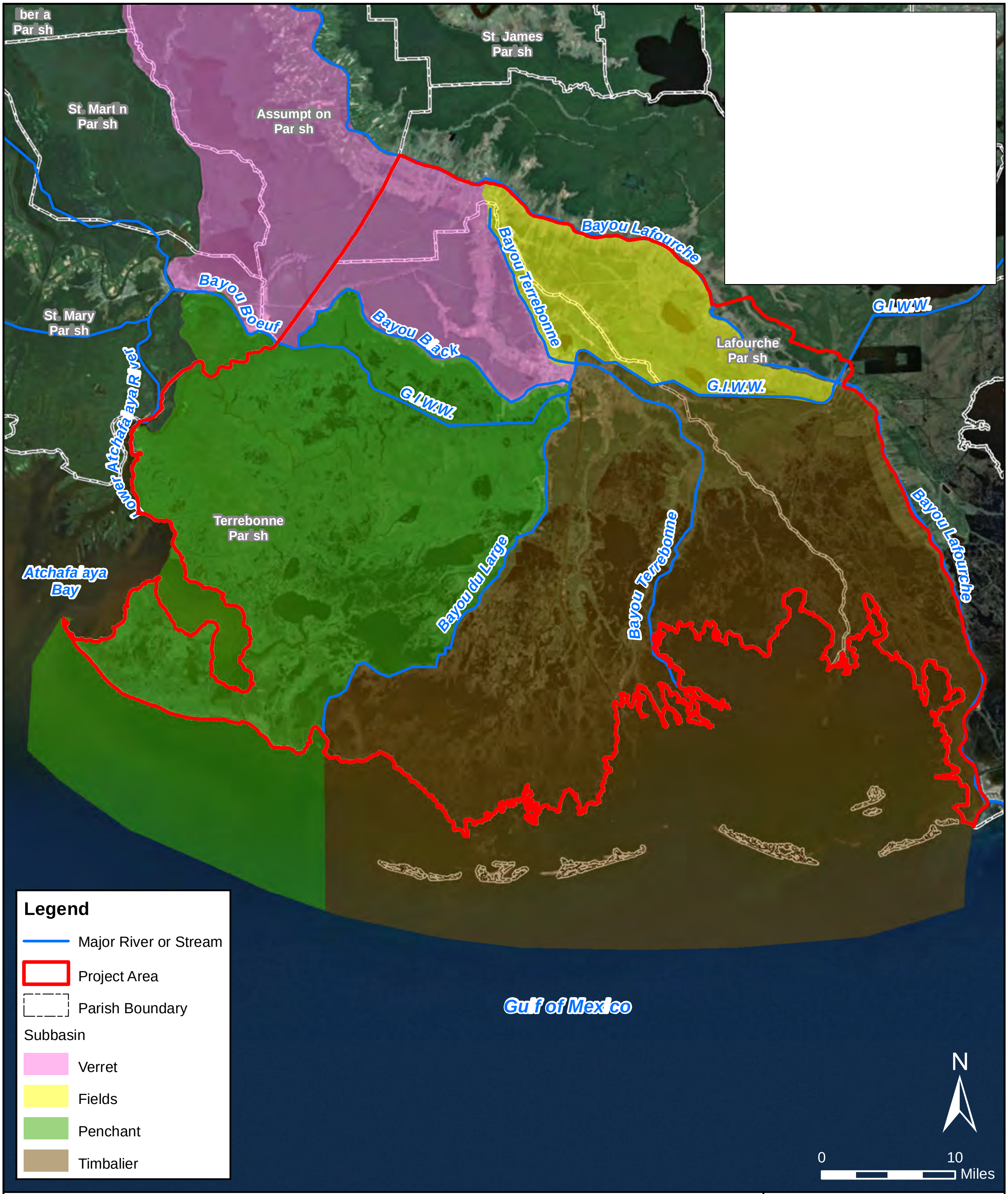

Figure 5-2. Lower Terrebonne Subbasins in Project Area

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery
Subbasins adapted from Louisiana Coastal Wetlands Restoration Plan, November 1993

Gulf Engineers & Consultants

Figure: 5-2
Date: June 2012
Scale: 1:635,000
Source: USGS/GEC
Map ID: 273160010-3004

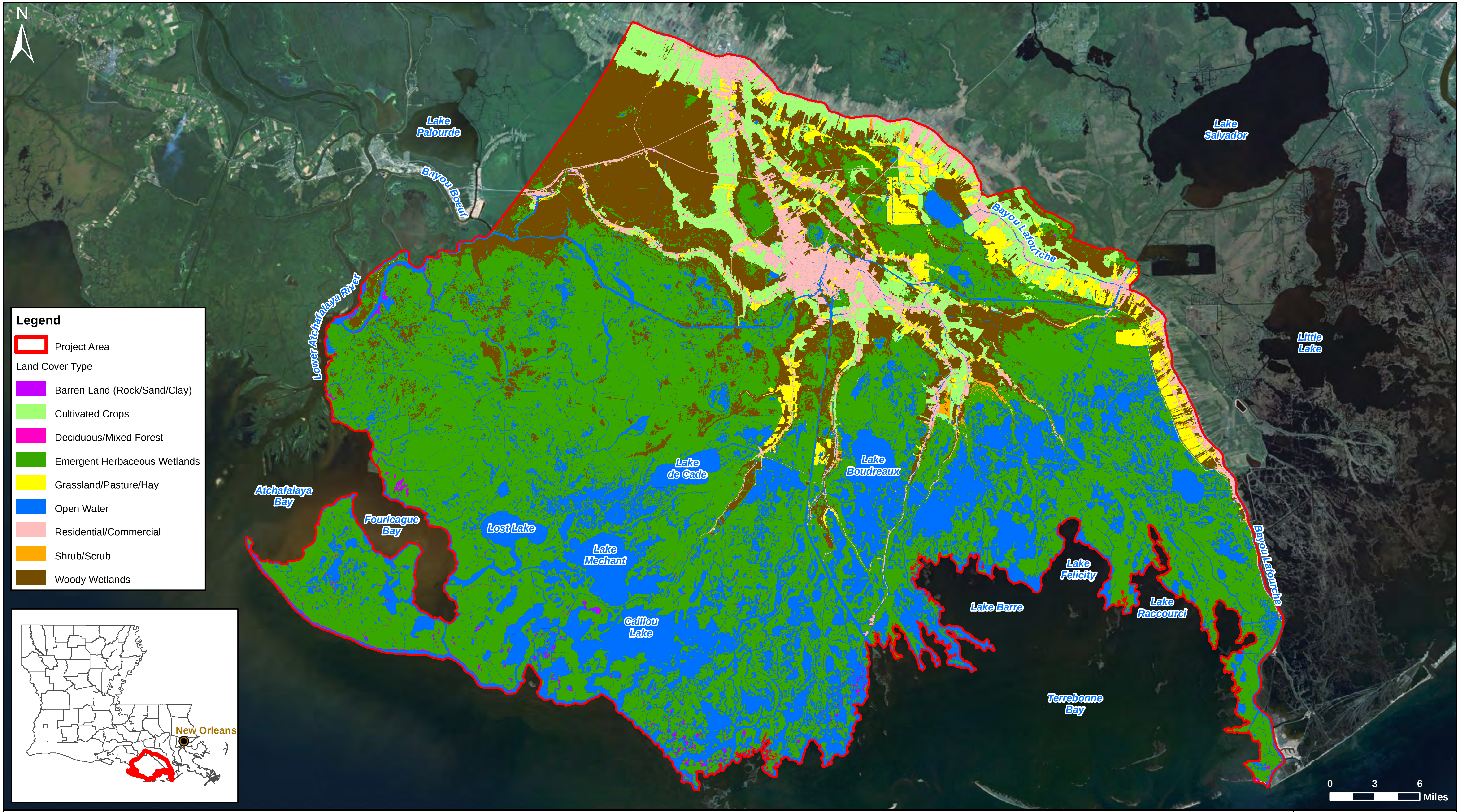

Figure 5-3. Land Use/Land Cover in Project Area

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Land Cover Data: 2006 National Land Cover Database
Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 5-3
Date: June 2012
Scale: 1:384,000
Source: USGS 2006/GEC
Map ID: 273160010-3004

Table 5-1. Land Cover of the Study Area

Land Cover Type	Acres	Percent of Study Area
Emergent Herbaceous Wetlands	612,966	49.98%
Open Water	278,846	22.74%
Woody Wetlands	173,229	14.13%
Cultivated Crops	65,859	5.37%
Residential/Commercial	52,186	4.26%
Grassland/Pasture/Hay	33,704	2.75%
Barren Land (Rock/Sand/Clay)	5,345	0.44%
Shrub/Scrub	4,161	0.34%
Deciduous/Mixed Forest	84	0.01%
Total	1,226,380	100.00%

Source: National Land Cover Database, USGS, 2006 (http://seamless.usgs.gov/nlcd.php).

Very few residential structures are located in marsh. Only hunting and fishing camps built on pilings are typically constructed in those areas. Nearly all residential development in the study area occurs along one of the major bayou ridges, which do not generally flood except during extended or strong tropical events. Future development is expected to remain within forced drainage systems and along the ridges due to the increased costs associated with constructing homes outside of those areas.

5.1.3 CLIMATE

The climate of the study area is subtropical marine with long humid summers and short moderate winters. The climate is strongly influenced by the water surface of the many sounds, bays, lakes, and the Gulf of Mexico, as well as by seasonal changes in atmospheric circulation. During the fall and winter, the study area experiences cold continental air masses that produce frontal passages and drops in temperature. Snow is very infrequent. Mean temperatures collected from the National Oceanic and Atmospheric Administration (NOAA) station in Houma indicate an October to March mean temperature of 59.2ºF. During the spring and summer, the study area experiences tropical air masses that produce a warm, moist airflow conducive to thunderstorm development. Winds during the summer are generally from the south, bringing warm, moist air from the Gulf of Mexico, which can produce periods of intense rainfall associated with thunderstorms. Mean temperature from April through September in Houma is 77.4ºF with an average annual mean temperature of 68.3ºF. NOAA data indicate that average annual rainfall for the area is approximately 65 inches, while mean monthly rainfall is 5.5 inches, with the highest rainfall typically occurring from July through September (NOAA 2011a). The study area is subject to periods of both drought and flood, and the climate rarely seems to truly exhibit "average" conditions.

The study area is susceptible to tropical waves, tropical depressions, tropical storms, and hurricanes. These weather systems can cause considerable property and environmental damage and loss of human life. Data obtained from the NOAA Coastal Services Center indicate that the storm centers of at least 38 tropical cyclones with a Saffir-Simpson Hurricane Scale of Category 1 or higher have passed within 50 miles of the study area during the interval 1851-2008 (the latest year available in the NOAA database), and at least 54 such tropical cyclones have passed within 100 miles of the study area during the same interval (NOAA 2011b). Although it is assumed that storms with higher wind speeds produce more damage, Hurricane Juan, which was a Category 1 Storm, produced significant damage from tidal flooding. These storms can also produce large amounts of rain in a given location. According to NOAA data from 1851 through 2008, tropical storms (exclusive of hurricanes) occur with a frequency of about one storm every five years, and hurricanes of Category 1 or higher occur about once every four-and-a-half years within 100 miles of Houma.

The most recent tropical cyclones to affect the study area were hurricanes Katrina and Rita, which occurred in August 2005 and September 2005, respectively, and hurricanes Gustav and Ike, which occurred in September 2008. The area of marsh lost along the Louisiana coast as a result of hurricanes Katrina and Rita (192,000 acres) was over one third of the total wetland losses predicted to occur by the year 2050 by the Coast 2050 Report (LCWCRTF and WCRA 1998). Within the Terrebonne Basin, roughly 12,160 acres of wetlands were converted to open water between 2004 and 2005 (Barras 2006), equal to 8.4 percent of the losses predicted to occur by 2050.

Climate Change

USACE Engineering Circular 1165-2-212 requires consideration of impacts of sea level change on all phases of USACE Civil Works programs and provides guidance for incorporating the direct and indirect physical effects of projected future sea-level change in managing, planning, engineering, designing, constructing, operating, and maintaining USACE projects. It is important to distinguish between eustatic and RSLR. RSLR consists of eustatic or regional sea level rise combined with subsidence. Eustatic sea level rise is defined as the global increase in oceanic water levels primarily due to changes in the volume of major ice caps and glaciers, and expansion or contraction of seawater in response to temperature changes. Regional sea level rise may differ slightly from eustatic sea level rise in large, semi-enclosed water bodies like the northern Gulf of Mexico. Regional sea level rise in the project area was determined to be approximately 0.75 feet per century. Subsidence is the decrease in land elevations, primarily due to the consolidation of sediments, faulting, groundwater depletion, and possibly oil and gas withdrawal. Subsidence in the project area was calculated using the two closest long-term gauges, located at Grand Isle and Eugene Island, and was determined to be approximately 2.35 feet per century. RSLR affects project area marshes by gradually inundating marsh plants. Marsh soil surfaces must vertically accrete to keep pace with the rate of RSLR, or marshes eventually convert to open water due to the depth of submergence.

5.1.4 GEOLOGY

The geology of the area is heavily influenced by the Mississippi River and its delta plain, a complex of abandoned and active deltas of the Mississippi River. Three of four abandoned delta complexes shaped Terrebonne and Lafourche parishes as sediments were deposited on the Pleistocene Prairie. The Mississippi River laid down sediments from 100 to 200 meters thick at each delta (Penland *et al*. 1988). The abandoned deltas were formed generally from the west to the east in chronological sequence starting about 9,000 years before present and ending less than 100 years ago (Sevier 1990). The most recent sediments of an abandoned delta were laid down as part of the Lafourche delta.

The Lafourche delta complex in the study area, which includes Bayou Terrebonne, Bayou Black, Bayou Blue, Bayou Pointe aux Chenes, Bayous Grand and Petit Caillou, and Bayou du Large, began forming some 3,500 years ago. Delta development ended when the Mississippi River shifted to the east about 500 years ago to adopt its current configuration. From that time until about 100 years ago, overflows from the Mississippi River continued to maintain the Lafourche delta complex. The complex began to degrade when Bayou Lafourche was closed off early in the 20th century (Mossa *et al*. 1990).

After delta abandonment occurs, sediments slowly deteriorate as they subside under their own weight. In addition, sea level has been rising throughout this time by about 5 to 8 meters (Mossa *et al*. 1990). Historically, the cycle of delta growth and destruction took about 5,000 years (Gosselink and Sasser 1991). However, because of a variety of factors (most notably human), delta destruction is taking place in a few human generations rather than over thousands of years.

According to Turner (1990), the driving factors in landscape changes include sea level rise, geological compaction, a 50 percent reduction in sediment supply from the Mississippi River since the 1950s, and hydrologic changes. Delaune *et al*. (1994), Kuecher (1994), and Gagliano (1999) conclude that geological factors, such as consolidation of deltaic sediments and active faulting, appear to be the underlying cause for a majority of the land loss in coastal Louisiana. Hydrocarbon withdrawals may also be a significant factor by activating faults that lead to subsidence (White and Morton 1997).

Subsidence

Louisiana has the highest subsidence rates of any other land area around the Gulf of Mexico at 0.8 cm/year to 1.07 cm/year (Penland *et al*. 1987). Louisiana is also experiencing the highest rate of RSLR in the Gulf of Mexico, with rates between 1.03 cm/year and 1.19 cm/year. Concerning coastal wetlands and flood damages to coastal communities, RSL (apparent subsidence) is a more critical unit of measure than subsidence or sea level rise by themselves, as described in the Climate Change section above.

Published literature shows that Terrebonne Parish is subsiding at an average de-compacted rate of 0.31 cm/year according to Kuecher (1994), a much higher rate than the 0.12 cm/year eustatic rise in sea level reported by Gornitz *et al*. (1982). Wiseman *et al*. (1991) determined a subsidence rate of 1.0 cm/year near the coast with a decreasing rate moving northward. Penland *et al*. (1989) found that subsidence in the Terrebonne Basin was the highest in Louisiana. Turner and Cahoon (1987) discovered at least a 5.0-mm difference between annual subsidence and accretion in the Terrebonne Basin. Adding to that difference the 0.12 cm/year eustatic sea level rise gives a conservative estimate for RSLR of 0.17 cm/year in southern Terrebonne Parish.

5.1.5 SOILS

Soils are a critical element of coastal habitats because they support vegetation growth and open-water benthic productivity. The study area lies entirely within the south-central region of the Mississippi River Delta Plain. It falls within two major land resource areas (MLRAs): MLRA 131 and MLRA 151. MLRA 131, the Southern Mississippi River Alluvium, makes up about 29 percent of the study area. MLRA 151, the Gulf Coast Marsh, makes up the remaining 71 percent of the study area (NRCS 2011). The soils formed from sediments deposited by former channels of the Mississippi River and its distributaries on the Atchafalaya and Lafourche Delta Complex. Loamy soils are dominant on the high and intermediate parts of the natural levees, and clayey soils are dominant on the lower parts of the natural levees and in backswamps. Elevations range from about 14 feet above mean sea level along the natural levee of Bayou Terrebonne in the northern part of the study area to about five feet below sea level in the former marshes and swamps that have been drained.

The Swamp and Marsh soil associations comprise approximately 80 percent of soils within the study area (Figure 5-4) (McDaniel and Trahan 2007; Matthews 1984). These associations occur over a broad plain about level with the Gulf of Mexico between the ridge areas and are frequently flooded. Marsh soils, both fresh and saline, generally have a semifluid peat or muck surface layer, up to four feet thick, over alluvial clays and silty clays. Soil associations include Fausse-Barbary, Harahan-Rita, Allemands-Kenner, Clovelly-Lafitte, Timbalier-Bellpass, and Scatlake. These soils are generally too wet and soft for any agricultural uses. The marsh soils’ organic content decreases as conditions move from fresh to saline. Fresh marsh soils contain a mean of 52 percent organic matter, whereas saline soils contain only 18 percent organic matter (Chabreck 1982). Soils in the swamp soil association are usually wet and frequently flooded. These soils, identified primarily as Barbary-Fausse soils, are level, very poorly drained soils that have a mucky or clayey surface layer and a clayey subsoil. Some acreage of former marshes and swamps have been protected, pumped-off, and drained and are used as pasture or for urban use. Rita-Harahan soils have been identified in these areas. Rita-Harahan soils are level, poorly drained soils that have a clayey or mucky surface layer and a clayey or loamy subsoil; in former swamps and marshes. Uses include woodland, pasture, recreation, and campsites. The remaining 20 percent of soils in the study area are comprised of natural ridges, levees, and open water (Figure 5-4).

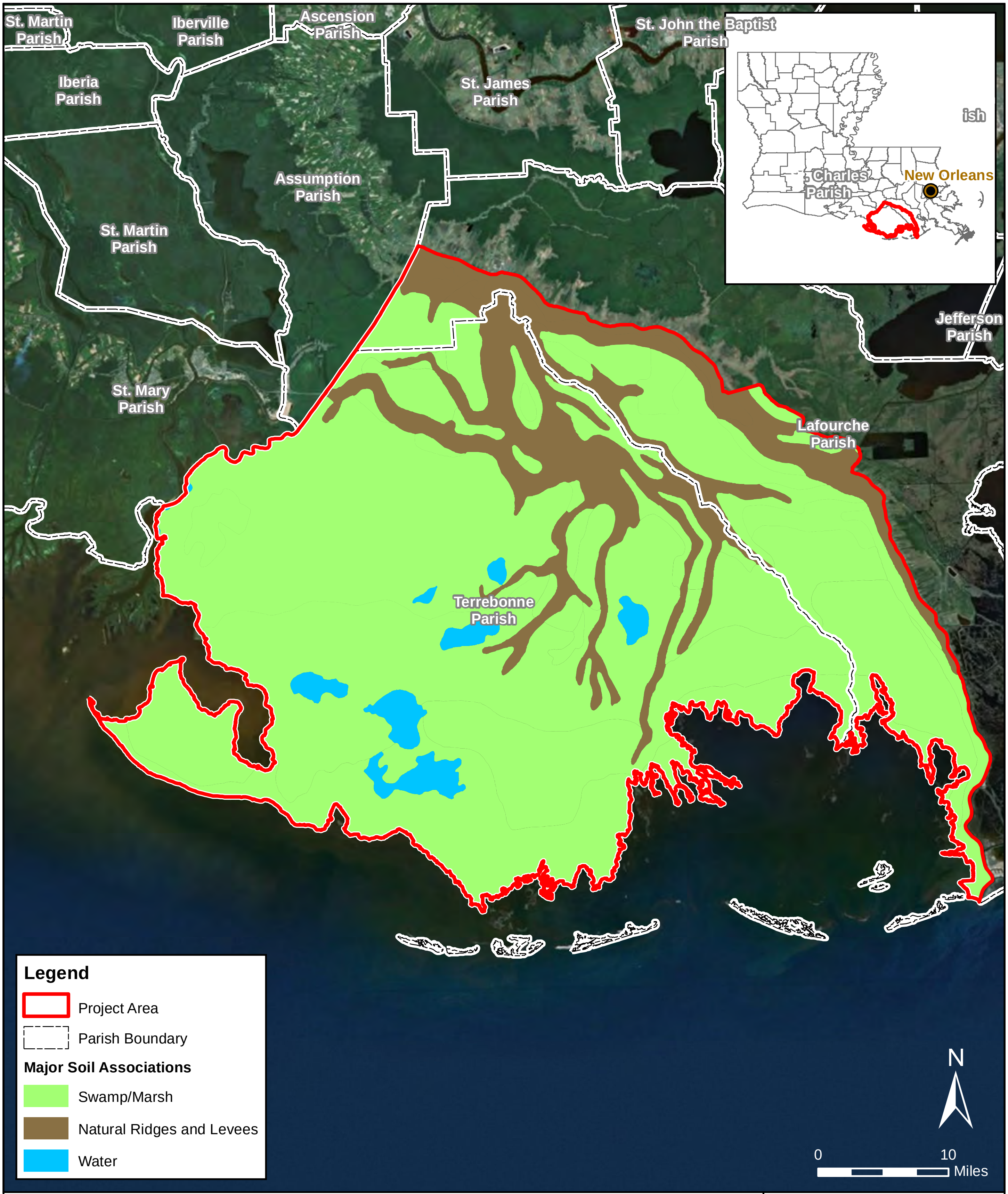

Figure 5-4. Major Soil Associations in Project Area

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

USGS STATSGO Soils Data

Gulf Engineers & Consultants

Figure: 5-4
Date: June 2012
Scale: 1:650,000
Source: USGS/GEC
Map ID: 273160010-3004

The lower portions of the natural levees are formed by the Sharkey and Schriever soil associations. These soils are black to dark gray on the surface and have higher clay material and organic matter content than do soil associations on the highest portions of the natural levees. They are subject to rare or occasional flooding, and support bottomland vegetation. Uses include woodland, pasture, recreation, campsites, and wildlife habitat. The highest parts of the natural levees along the bayous, including along Highway 57 to the south of Lake Boudreaux, contain soils of the Commerce and Cancienne-Grammercy associations. These level, somewhat poorly drained and poorly drained brown to grayish brown soils have a loamy or clayey surface layer and clayey subsoil or are loamy throughout. They rarely flood and are used mainly for cropland, pasture, woodland and urban purposes. Some narrow, loamy, natural levee ridges in the southeastern and east-central parts of Terrebonne Parish extend south into the Gulf Coast Marsh. These areas are subject to occasional flooding during tropical storms and are used mainly for camps, homesites, and activities associated with the seafood industry.

Sugar cane is the principal agricultural crop grown in the region (McDaniel and Trahan 2007; Matthews 1984). Corn is also a major crop. Soybeans, rice, vegetables, and pasture grasses are also grown. Approximately 10.6 percent of the total acreage in the study area meets the soil requirements for prime farmland, as discussed in more detail in the Prime Farmland section below.

5.2 Significant Resources

This section describes the significant resources that may be impacted by the project. These significant resources are recognized by laws, executive orders, regulations, and other standards of national, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. The institutional, technical, and public importance of each resource is described in Table 5-2.

Table 5-2. Significant Resources in the Study Area

Resource	Institutionally Important	Technically Important	Publicly Important
Coastal Vegetation and Wetlands	Clean Water Act of 1977; Executive Order (EO) 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972; North American Wetlands Conservation Act; Estuary Protection Act of 1968; EO 11988, Floodplain Management; and Fish and Wildlife Coordination Act of 1958, as amended.	They provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; they provide storage areas for storm and flood waters; they serve as natural water filtration areas; they provide protection from wave action, erosion, and storm damage; and they provide various consumptive and non-consumptive recreational opportunities.	The public values the wildlife and recreational functions that wetlands provide. Environmental organizations and the public support the preservation of marshes.

Table 5-2. Significant Resources in the Study Area

Resource	Institutionally Important	Technically Important	Publicly Important
Prime and Unique Farmland	Farmland Protection Policy Act of 1981; Food Security Act of 1985.	The 1981 Congressional report, *Compact Cities: Energy-Saving Strategies for the Eighties*, identified the need for Congress to implement programs and policies to protect farmland and combat urban sprawl and the waste of energy and resources that accompanies the conversion of farmland.	The public values the present economic significance or potential for future economic significance. The public values rural landscapes and local farming.
Aquatic Resources/ Fisheries	Fish and Wildlife Coordination Act of 1958; Endangered Species Act of 1973; Coastal Zone Management Act; Estuary Protection Act; Magnuson-Stevens Fishery Conservation and Management Act of 1976; Magnuson-Stevens Act Reauthorization of 2006.	They are a critical element of many valuable freshwater and marine habitats; they are an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The public places high priority on their aesthetic, recreational, and commercial value.
Essential Fish Habitat (EFH)	Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Public Law 104-297).	Federal and state agencies recognize the value of EFH. The Act states EFH is “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."	The public places a high value on seafood and the recreational and commercial opportunities EFH provides.
Wildlife	Fish and Wildlife Conservation Act of 1980; Fish and Wildlife Coordination Act of 1958; Migratory Bird Treaty Act of 1918; Endangered Species Act of 1973; EO 13186, Migratory Bird Habitat Protection.	They are a critical element of many valuable aquatic and terrestrial habitats; they are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The public values the aesthetic, recreational, and commercial value of wildlife.

Table 5-2. Significant Resources in the Study Area

Resource	Institutionally Important	Technically Important	Publicly Important
Threatened and Endangered Species	Endangered Species Act of 1973; Marine Mammal Protection Act of 1972; Migratory Bird Treaty Act of 1918, as amended.	USACE, USFWS, NMFS, NRCS, USEPA, LDWF, and LADNR cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.
Noise	Noise Control Act of 1972; Occupational Safety and Health Standards.	Noise can adversely affect the physiological or psychological well being of people.	The public has concern for the potential annoyance and adverse effects of noise on wildlife and humans.
Air Quality	Clean Air Act of 1963; Louisiana Environmental Quality Act of 1983.	State and Federal agencies recognize the status of ambient air quality in relation to the National Ambient Air Quality Standards.	Virtually all citizens express a desire for clean air.
Hydrology and Water Quality	NEPA Act of 1969; Clean Water Act of 1977; Flood Control Act of 1944; Coastal Barrier Resources Act; Rivers and Harbors Act of 1899; River and Harbor and Flood Control Act of 1970; Watershed Protection and Flood Prevention Act; Submerged Land Act; Coastal Zone Management Act; Safe Drinking Water Act; Estuary Protection Act; Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and Executive Order 11988 Floodplain Management	This resource is technically significant because Civil Works water resources development projects typically impact (positively or negatively) the interrelationships and interactions between water and its environment.	This resource is publicly significant because the public demands clean water, hazard-free navigation, and protection of estuaries and floodplains.

Table 5-2. Significant Resources in the Study Area

Resource	Institutionally Important	Technically Important	Publicly Important
HTRW	Engineer Regulation (ER) 1165-2-132, RCRA, Comprehensive Environmental Response, Compensation and Liability Act, Resource Conservation and Recovery Act	A phased and documented review to provide for early identification of HTRW potential at Civil Works project sites is required to avoid adverse impacts.	Due to the many potential adverse impacts of HTRW, the public is concerned about the identification and treatment of HTRW as early as practical in project planning.
Socio-Economic Resources	NEPA of 1969, Estuary Protection Act, River and Harbors Acts, Clean Water Act, Watershed Protection and Flood Protection Act, Water Resources Development Acts.	The social and economic welfare of the nation may be positively or adversely impacted by the proposed action.	The public is concerned about the impact of water resources projects on health, welfare, economic, and social well-being.
Environmental Justice	Executive Order 12898 and the Department of Defense's Strategy on Environmental Justice of 1995,	The social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the project.	The public is concerned about the fair and equitable treatment of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions.
Cultural Resources	National Historic Preservation Act of 1966; Native American Graves Protection and Repatriation Act of 1990; Archeological Resources Protection Act of 1979.	State and Federal agencies document and protect sites because of their association or linkage to past events, to historically important persons, to design and construction values, and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection, restoration, enhancement, and recovery of historical resources.
Recreation Resources	Federal Water Project Recreation Act of 1965; Land and Water Conservation Fund Act of 1965.	Recreational resources provide high economic value to local, state, and national economies.	There is a 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.

Table 5-2. Significant Resources in the Study Area

Resource	Institutionally Important	Technically Important	Publicly Important
Aesthetics	USACE ER 1105-2-100; NEPA of 1969; coastal Barrier Resources Act of 1990; Louisiana's National and Scenic River's Act of 1988; National and Local Scenic Byway Program.	Unique combinations of geological, botanical, and cultural features are an asset to a study area.	Environmental organizations and the public support the preservation of unique natural and cultural landscapes.

5.2.1 COASTAL VEGETATION AND WETLANDS

WETLAND LOSS

Louisiana contains one of the largest expanses of coastal wetlands in the contiguous United States and accounts for 90 percent of the total coastal marsh loss occurring in the nation (USACE 2011). This ecosystem provides habitat for migratory birds, wildlife, finfish, shellfish, and other aquatic organisms including threatened or endangered species.

The need to minimize the loss of Louisiana coastal wetlands has been recognized by the U.S. Congress. Title VII of WRDA 2007 authorized the Louisiana Coastal Area (LCA) program, confirming the nation's commitment to coastal restoration in Louisiana. Other recent congressional acts have included the Coastal Wetlands Planning, Protection and Restoration Act program (CWPPRA or Breaux Act), which provides for targeted funds through 2019 to be used for planning and implementing projects that create, protect, restore, and enhance wetlands in coastal Louisiana. The Coastal Impact Assistance Program (CIAP) was authorized by Section 384 of the Energy Policy Act of 2005, to assist coastal states and their political subdivisions (parishes, counties, and boroughs) in mitigating the impacts from Outer Continental Shelf oil and gas production. Louisiana is one of the seven coastal states selected to receive funds to implement this program.

According to a 2010 analysis, the land-loss rate in the study area between 1985 and 2008 was approximately 2,600 acres per year, which equates to almost 60,000 acres lost over that time period. Projecting that loss rate over the next 75 years, approximately 200,000 additional acres are expected to be lost. Losses would be greater with higher rates of RSLR (USACE 2010).

Principal impacts to the marshes in the study area are due to storm surge and associated erosion and saltwater intrusion. Storm surge exerts widespread stress upon vegetation through the introduction of higher salinity concentrations than are normally present within the study area and by direct erosion of marsh plants and soils. Hurricanes Rita and Ike resulted in measurable storm surges within the study area (USACE 2010). As area marshes convert to open water, vital fish and wildlife habitat, and economic benefits are lost. Even thought wetland loss is a major issue in the area, the project was not formulated to provide benefits, but in a way as to not limit future coastal restoration plans.

Common Plant Species in the Study Area

Approximately 50 percent of the study area is comprised of emergent herbaceous wetlands, including fresh, intermediate, brackish, and saline marsh (Table 5-1) (USGS 2006). The remaining wetlands consist primarily of woody wetlands (primarily baldcypress/tupelo swamps and bottomland hardwood forest), which comprise almost 14 percent of the study area (USGS 2006). Plant species commonly encountered in these and other habitats of the study area, including open water, scrub/shrub, and deciduous/mixed forests, are listed in Table 5-3. Some fresh and intermediate waterbodies contain submerged or floating aquatic vegetation, as shown in Table 5-3 for the "Open Water" habitat type.

Table 5-3. Common Plants of the Morganza to the Gulf Study Area

Habitat Type	**Commonly Encountered Species**	
Fresh Marsh	• American cupscale (*Sacciolepis striata)* • Alligatorweed, (*Alternanthera philoxeroides)* • Baldwin's spikerush (*Eleocharis baldwinii)* • Bulltongue (*Sagittaria lancifolia)* • California bulrush (*Schoenoplectus californicus)* • Cattail (*Typha* sp.) • Coastal arrowhead (*Sagittaria graminea*)	• Coastal water-hyssop (*Bacopa monnieri*) • Common reed (*Phragmites australis)* • Giant cutgrass (*Zizaniopsis miliacea)* • Maidencane (*Panicum hemitomon*) • Pennywort (Hydrocotyle spp.) • Saltmeadow cordgrass (*Spartina patens)* • Spikerush (*Eleocharis sp.)*
Intermediate Marsh	• Bulltongue • Cattail • Coastal arrowhead, • Common reed • Coastal water-hyssop • Deer pea (*Vicia ludoviciana)* • Fall panicum (*Panicum dichotomiflorum*)	• Olney's bulrush (*Scirpus americanus)* • Saltmeadow cordgrass (*Spartina patens)* • Seashore paspalum (*Paspalum vaginatum)* • Three-cornered grass (*Scirpus olneyi)* • Wild millet (*Echinochloa* spp.)

Table 5-3. Common Plants of the Morganza to the Gulf Study Area		
Habitat Type	**Commonly Encountered Species**	
Brackish Marsh	• Camphorweed (*Heterotheca subaxillaris)* • Coastal water-hyssop • Deer pea • Leafy three-square (*Schoenoplectus robustus)*	• Three-cornered grass • Saltmeadow cordgrass, • Seashore saltgrass (*Distichlis spicata)*
Saline Marsh	• Black needlerush (*Juncus roemerianus*) • Leafy three-square • Saltgrass (*Distichlis spicata*)	• Saltmarsh cordgrass *(Spartina alterniflora)* • Saltmeadow cordgrass • Seashore saltgrass
Woody Wetlands	• American elm (*Ulmus Americana)* • Baldcypress • Bitter pecan *(Carya aquatica)* • Black willow *(Salix nigra)* • Boxelder *(Acer negundo)* • Chinese tallow-tree (*Triadica sebifera)*	• Drummond red maple (Acer rubrum drummondii) • Elderberry (*Sambucus* sp.) • Green ash (*Fraxinus pennsylvanica)* • Live oak (*Quercus virginiana*) • Sugarberry/Hackberry (*Celtis laevigata)* • Water oak (*Quercus nigra)*
Open Water (Includes Submerged and Floating-Leafed Vegetation)	• American lotus (*Nelumbo lute)* • Common Salvinia (*Salvinia minima)* • Coontail (*Ceratophyllum* spp.) • Duckweeds (*Limna spp.*) • Elodea (*Elodea canadensis)* • Eurasian milfoil (*Myriophyllum spicatum)* • Fanwort (*Cabomba caroliniana)* • Hydrilla (*Hydrilla verticillat)* • Pondweeds *(Potamogeton spp.)*	• Southern naiad (*Najas guadalupensis)* • Water fern (*Azolla* spp.) • Water hyacinth (*Eichhoria crassipes)* • Water lettuce (*Pistia stratiote)* • Water meal (*Wolffia* sp.) • Water stargrass (*Heteranthera dubia)* • White water lily (*Nymphaea odorat)* • Wigeongrass (*Ruppia maritime)* • Wild celery (*Vallisneria americana*)
Scrub/Shrub	• Black willow • Buttonbush *(Cephalanthus occidentalis)* • Chinese tallow-tree • Drummond red maple	• Elderberry • Groundsel bush *(Baccharis halimifolia)* • Wax myrtle *(Myrica* sp.)

Table 5-3. Common Plants of the Morganza to the Gulf Study Area		
Habitat Type	**Commonly Encountered Species**	
Deciduous/Mixed Forest	• American elm • Drummond red maple, • Green ash	• Live oak • Sugarberry/hackberry Sweet gum *((Liquidambar styraciflua)* • Water oak
Sources: Bahr *et al*. 1983; Chabreck and Condrey 1979; Connor and Day 1987; Gosselink 1984; Sasser *et al*. 1995; Sasser *et al*. 1996; Ritchie and Penland 1990; Ritchie *et al* 1995; Rogers *et al* 1990.		

Coastal Wetlands

Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years. From 1932 to 2000, Coastal Louisiana lost 1900 square miles of land (Coalition to Restore Coastal Louisiana, 2011). This land is not only an important habitat for fish and wildlife; it provides an indispensable storm buffer for communities, transportation routes, and energy infrastructure. Coastal wetlands in the study area range from fresh marshes in the northern portion, to intermediate and brackish marshes in the central portion, and finally to saline marshes along the Gulf of Mexico (Figure 5-5). Salinity ranges for the four types of coastal wetlands are shown in Table 5-4.

Table 5-4. Typical Salinity Ranges for the Four Coastal Wetland Types	
Wetland Type	**Typical Range (Parts per thousand)**
Fresh	0 – 0.5
Intermediate	0.5 - 5
Brackish	5 - 18
Saline	18 - 30
Source: Cowardin *et al*. 1979.	

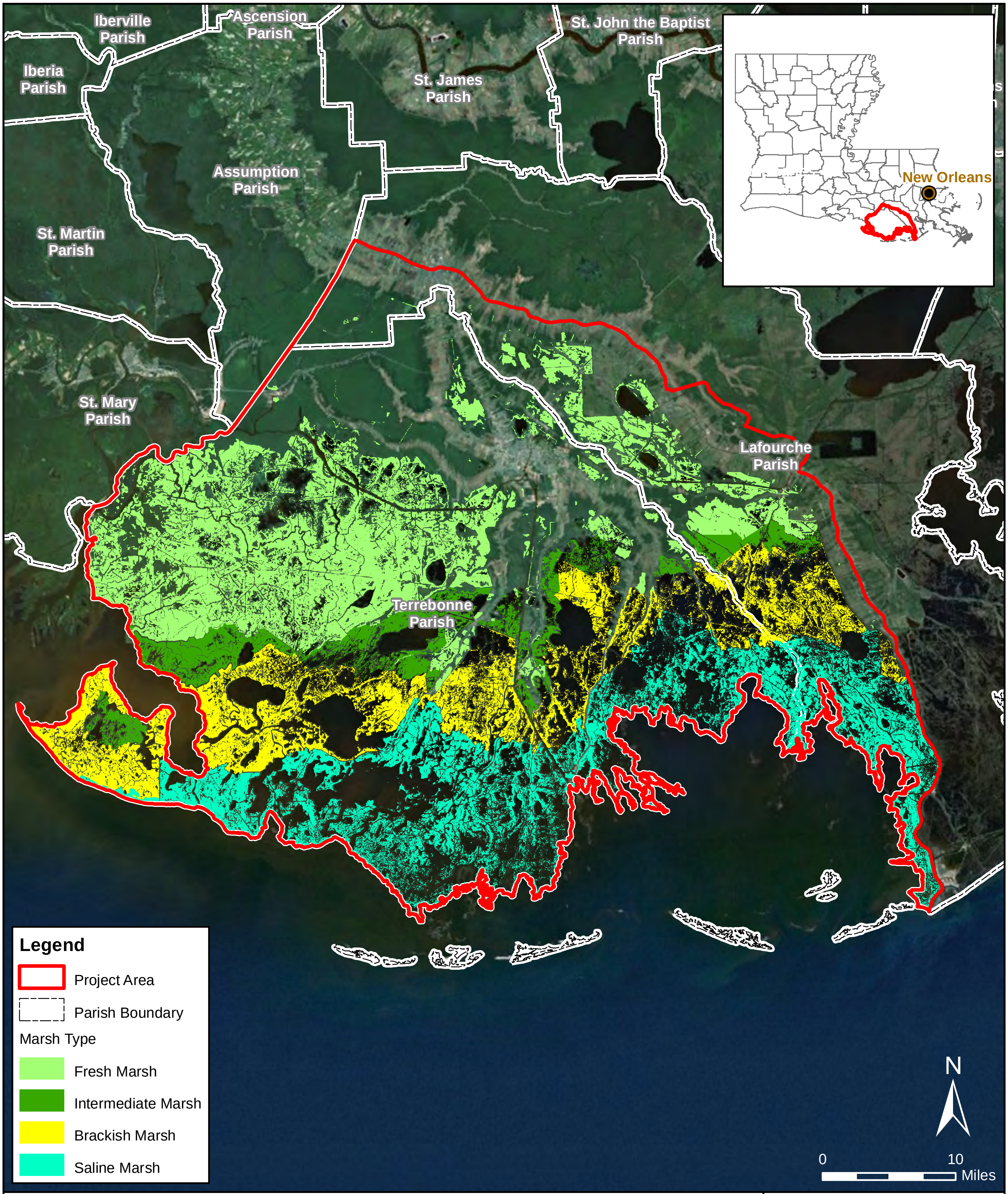

Figure 5-5. Marsh Types in Project Area

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

ESRI World 2D Imagery
Land Cover Data: Louisiana Gap Analysis Project

Gulf Engineers & Consultants

Figure: 5-5
Date: June 2012
Scale: 1:635,000
Source: NRCS/GEC
Map ID: 273160010-2815

In order to document the quality of the habitat in the project area in terms of its suitability for fish and wildlife use, the Wetland Value Assessment (WVA) methodology was used (CWPPRA 2007). A description of the WVA analysis can be found in Appendix F, *Wetland Value Assessment*.

The WVA methodology has been approved for use in the Morganza to the Gulf project. On November 11, 2011, Corps of Engineers Headquarters approved the use of the Barrier Headland, Barrier Island, Bottomland Hardwood, Coastal Chenier, and Swamp Models for use in coastal Louisiana. On February 28, 2012, Corps headquarters approved the Coastal Marsh Community Model for this project. On March 12, 2012, the Corps' National Ecosystem Planning Center of Expertise recommended single use approval for this project. Copies of these correspondences are located in Appendix F.

Rare Plant Species and Natural Communities

The Louisiana Natural Heritage Program describes rare, unique, and imperiled plant species and vegetative communities occurring in Louisiana. These plants and natural communities are nestled within the broader vegetative habitats and are important in that they contribute to the extensive diversity of the coastal ecosystem, enhance its productivity, and are essential to the stability of the bionetwork. The program lists 45 plant species or natural communities as occurring in Terrebonne and Lafourche parishes (Table 5-5).

Table 5-5. Rare Plant Species and Natural Communities of Terrebonne and Lafourche Parishes

Common Name	**Scientific Name**	**State Rank***
Arrow-grass	*Triglochin striata*	S1
Big Sand bur	*Cenchrus myosuroides*	S1
Brackish Marsh	Brackish Marsh	S3, S4
Canada Spikesedge	*Eleocharis geniculata*	S1
Coast Indigo	*Indigofera miniata*	S1
Coastal Dune Grassland	Coastal Dune Grassland	S1, S2
Coastal Dune Shrub Thicket	Coastal Dune Shrub Thicket	S1
Coastal Live Oak-Hackberry Forest	Coastal Live Oak-Hackberry Forest	S1, S2
Coastal Mangrove-Marsh Shrubland	Coastal Mangrove-Marsh Shrubland	S3
Creeping Spike-rush	*Eleocharis fallax*	S1
Cypress-Tupelo Swamp	Cypress-Tupelo Swamp	S4
Dune Sandbur	*Cenchrus tribuloides*	S2
Estuarine Submergent Vascular Vegetation	Estuarine Submergent Vascular Vegetation	S1, S2
Floating Antler-fern	*Ceratopteris pteridoides*	S2
Freshwater Marsh	Freshwater Marsh	S1, S2

Golden Canna	*Canna flaccida*	S4
Gregg's Amaranth	*Amaranthus greggii*	S3
Gulf Bluestem	*Schizachyrium maritimum*	S1
Hairy Comb Fern	*Ctenitis submarginalis*	S1
Marine Submergent Vascular Vegetation	Marine Submergent Vascular Vegetation	S1, S2
Millet Beakrush	*Rhynchospora miliacea*	S2
Rooted Spike-rush	*Eleocharis radicans*	S1
Salt Marsh	Salt Marsh	S3, S4
Sand Dune Spurge	*Chamaesyce bombensis*	S1
Sand Rose-gentian	*Sabatia arenicola*	S1
Scaevola	*Scaevola plumieri*	SH
Scrub/Shrub Swamp	Scrub/Shrub Swamp	S4, S5
Sea Oats	*Uniola paniculata*	S2
Swamp Milkweed	*Asclepias incarnata*	S2

*State Element Ranks: S1= critically imperiled in Louisiana because of extreme rarity; S2= imperiled in Louisiana because of rarity; S3= Rare and local through the stat or found locally in a restricted region of the State; S4= apparently secure in Louisiana with many occurrences; S5= demonstrably secure in Louisiana; SH= of historical occurrence in Louisiana; SZ= transient species in which no specific consistent area of occurrence is identifiable; B or N may be used as a qualifier to indicating whether the occurrence is breeding or non-breeding; S?= Rank uncertain. Source: Louisiana Natural Heritage Program, June 2011 (http://www.wlf.louisiana.gov/wildlife)

Invasive Species - Vegetation

Invasive plant species are found in the project area. The most visible is the Chinese tallow tree, a successful invader of chenier habitats. It has affected plant community structure by becoming the most abundant woody species at many locations. It has the potential to invade surrounding marshes and convert them from herbaceous to woody plant communities (Neyland and Meyer 1997). Other important invasives include water hyacinth and giant salvinia (*Salvinia molesta*), both of which are present in the marshes and canals of South Louisiana. Both can form dense mats that cover entire bodies of water with a thick layer that blocks sunlight, thereby reducing photosynthesis, reducing dissolved oxygen, and contributing to fish kills.

Other invasive aquatic plants include the following (Louisiana Department of Wildlife and Fisheries (LDWF) 2005):

- Alligatorweed (*Alternanthera philoxeroides*)
- Brazilian waterweed (*Egeria densa*)
- Cogon grass (*Imperata cylindrical*)
- Common salvinia (*Salvinia minima*)
- Dotted duckweed (*Landoltia (Spirodela) punctata*)
- Eurasian water-milfoil (*Myriophyllum spicatum*)
- Hydrilla (*Hydrilla verticillata*)
- Parrot feather (*Myriophyllum aquaticum*)

- Peruvian watergrass (*Luziola peruviana*)
- Torpedo grass (*Panicum repens*)
- Uruguay waterprimrose (*Ludwigia grandiflora*)
- Water-lettuce (*Pistia stratiotes*)
- Wild taro (*Colocasia esculenta*)

5.2.2 PRIME AND UNIQUE FARMLAND

The Farmland Protection Policy Act of 1981 was enacted to minimize the extent that Federal programs contribute to the unnecessary and irreversible conversion of prime or unique farmland to non-agricultural uses. USDA's NRCS is responsible for designating prime or unique farmland protected by the act. Prime farmland, as defined by the act, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land,
but it is not urban or built-up land or water areas. Unique farmland is defined by the act as land other than prime farmland that is used for the production of specific high value food and fiber crops, such as citrus, tree nuts, olives, and vegetables.

Based on data accessed from the NRCS in 2011, approximately 128,144 acres, or 10.6 percent, of the total acreage in the study area meet the soil requirements for prime farmland (http://websoilsurvey.nrcs.usda.gov) (Figure 5-6). Unique farmland is not located in the study area. Prime farmland within the study area is limited to natural ridge tops and consists of the following soil associations: Cancienne silt loam, Cancienne silty clay loam, Commerce silt loam, Commerce silty clay loam, Grammercy silty clay loam, Schriever clay, Sharkey silty clay loam, Sharkey clay, and Vacherie silt loam. Not all of prime farmland in the study area is used for agriculture. NRCS soil surveys indicate nearly all prime farmland acreage in Terrebonne Parish is planted in crops, but only about half of the acreage in Lafourche Parish is agricultural. The crops grown on this land are mainly common bermudagrass, improved bermudagrass, soybeans, wheat, sugar cane, bahiagrass, and corn.

5.2.3 AQUATIC RESOURCES

Benthic Resources

The bottom estuarine substrate or benthic zone regulates or modifies most physical, chemical, geological, and biological processes throughout the entire estuarine system via what is called a *benthic effect*. Benthic animals are directly or indirectly involved in most physical and chemical processes that occur in estuaries and trophic relationships that occur in aquatic ecosystems (Day *et al.* 1989). Benthic communities do not have a static structure and provide a residence for many sessile, burrowing, crawling, and even swimming organisms. Oysters and mussels from the epibenthic community provide commercial and recreational fisheries and create oyster reef habitats used by many marine and estuarine organisms.

Estuarine benthic organisms include: macrobenthic (e.g., molluscs, worms, large crustaceans); microbenthic (e.g., protozoa); and meiobenthic (e.g., microscopic worms and crustaceans) groups (Day *et al.* 1989). The benthic community stores organic matter and inorganic nutrients and is a site for many vital chemical exchanges and physical interactions. Primary consumer groups of the benthic habitat include: bacteria and fungi, microalgae, meiofauna, and microfauna

(Mitsch and Gosselink 2000). Less than 10 percent of the above-ground primary production of the salt marsh is grazed by aerial consumers. Most plant biomass dies and decays and its energy is processed through the detrital pathway. A major link in the aquatic food web between plants and predators is formed by the conversion of plant material (formed in primary production) by benthic detritivores and herbivores to animal tissue (Cole 1975).

The salt marsh is a major producer of detritus for both the salt marsh system and the adjacent estuary (Mitsch and Gosselink 2000). In some cases, exported marsh detritus is more important than the phytoplankton based production to the estuary. Detritus export and the shelter found along marsh edges make salt marshes important nursery areas for many commercially important fish and shellfish. Salt marshes have been shown at times to be both sources and sinks of nutrients, particularly nitrogen.

Plankton Resources

Plankton provides a major, direct food source for animals in the water column and in the sediments (Day *et al.* 1989). Plankton is responsible for at least 40 percent of the photosynthesis occurring on the earth and has an important role in nutrient cycling. Plankton productivity is a major source of primary food energy and is the major source of autochthonous organic matter in most estuarine ecosystems (Day *et al.* 1989).

Plankton communities have an important role in Louisiana coastal waters. There are three groups of plankton: bacterioplankton, phytoplankton, and zooplankton (Knox 2001). Bacterioplankton are microscopic bacteria important in the decomposition of organic material. Phytoplankton includes the primary producers of the water column and forms the base of the estuarine food web. Zooplankton provides the trophic link between bacterioplankton and phytoplankton and the intermediate level consumers such as aquatic invertebrates, larval fish, and smaller forage fishes (Day *et al.* 1989).

Phytoplankton are tiny, single-cell algae that drift with the motion of water. Diatoms and dinoflagellates are the dominant phytoplankton groups; other important groups include green and blue-green algae. In Louisiana, eutrophic conditions can lead to noxious blue-green algae blooms. Some blue-green algae produce toxins, and large-scale blooms can lead to hypoxia and result in fish kills. These blooms tend to occur in fresh or oligohaline waters, up to approximately seven parts-per-thousand (ppt) salinity. In more saline environments, dinoflagellates have been associated with red tides, which are capable of killing fish and shellfish and can create public health problems through airborne respiratory toxins and shellfish contamination. Although phosphorus is typically the

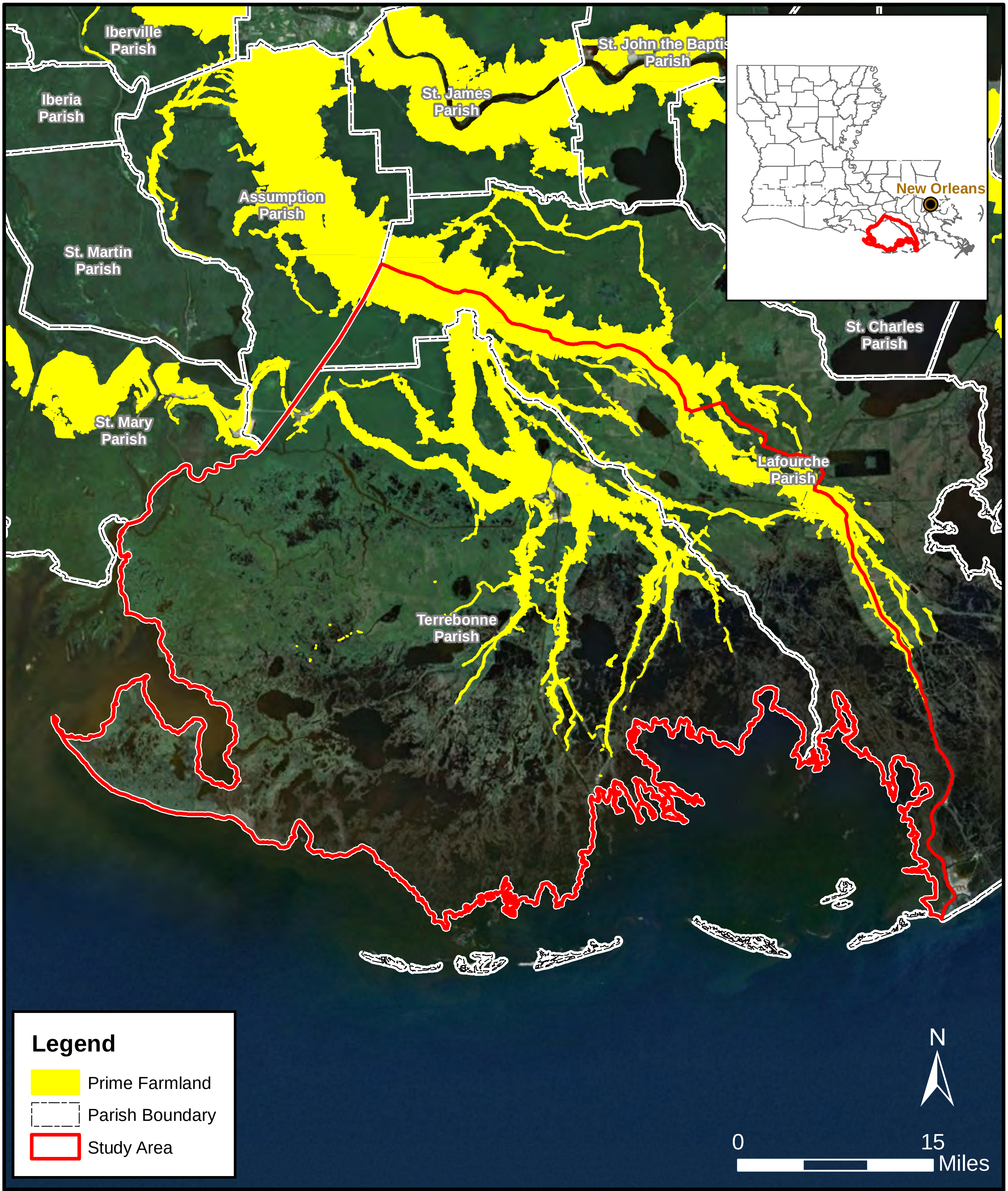

Figure 5-6. Prime Farmland

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

ESRI World 2D Imagery

Gulf Engineers & Consultants

Figure: 5-6
Date: June 2012
Scale:1:650,000
Source: ESRI/GEC
Map ID: 273160010-3004

limiting nutrient attributed to excessive algal growth (blooms), phytoplankton production in coastal wetland systems is most likely to be nitrogen limited (Day *et al.* 2001).

Zooplankton includes small crustaceans, jellyfishes and siphonophores, worms and mollusks, and egg and larval stages of most benthic and nektonic animals (Rounsefell 1975). Zooplankton are consumed by a variety of estuarine consumers, but also is important in nutrient cycling. Although some members of the zooplankton community are euryhaline, others have distinct salinity tolerances (Hawes and Perry 1978). Freshwater zooplankton is dominated by four major groups: protozoa, rotifers, cladocerans, and copepods.

Some seasonal patterns of zooplankton abundance in estuaries occur regionally, although there are no clear general patterns (Day *et al.* 1989). The zooplankton of many estuarine waterbodies is dominated by copepods. Copepods and cladocerans are frequently abundant in low salinity waters of Louisiana (Hawes and Perry 1978). Larval crustaceans can compose a large component of the zooplankton community.

5.2.4 FISHERIES

Fishery resources 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 species are important commercial resources.

In 2009, Louisiana's fishery landings were over 1,005 million pounds (over $284 million dockside value). This represented 12.7 percent of the 2009 U.S. landings in terms of pounds and 7.3 percent in terms of dollars. Fishery landings in 2009 at ports in or near the study area were: Dulac-Chauvin with 42.4 million pounds ($50.9 million dockside value) and Golden Meadow-Leeville with 25.6 million pounds ($27.4 million dockside value) (NMFS 2011).

The study area contains a variety of aquatic habitats, including ponds, lakes, bayous, canals, shallow open water areas, and embayments. Salinities in the area range from fresh water to saline. Fresh and intermediate waterbodies frequently contain submerged or floating aquatic vegetation; however, brackish and saline areas generally do not contain much submerged vegetation.

Fishes and macrocrustaceans in the study area are of three general types: freshwater, resident, and transient marine species. Freshwater species generally live in the freshwater portions of the area, although some species can tolerate low salinities. Resident species are generally smaller and do not commonly migrate very far. Marine transient species spend a portion of their life cycle in the estuary, generally spawning offshore or in high-salinity bays, and use coastal marshes as nursery areas (Herke 1971, 1995).

Salinity and submerged vegetation affect the distribution of fish and macrocrustaceans in coastal marshes. The most abundant species collected in freshwater and intermediate marsh areas adjacent to the project area were residents predominantly associated with submerged aquatic vegetation such as grass shrimp (*Palaemonetes* sp.), sheepshead minnow *(Cyprinodon variegatus)*, rainwater killifish *(Lucania parva)*, least killifish *(Heterandria formosa)*, inland silverside *(Menidia beryllina)*, sailfin molly *(Poecilia latipinna)*, and western mosquitofish *(Gambusia affinis)* (Rogers *et al.* 1992). The most abundant marine transient species collected near the project area included Gulf menhaden *(Brevoortia patronus)*, blue crab *(Callinectes sapidus)*, bay anchovy *(Anchoa mitchilli)*, and striped mullet *(Mugil cephalus)* (Rogers *et al.* 1992).

The most abundant species collected by otter trawling in Lake Barre included brown shrimp *(Farfantepenaeus aztecus)*, Atlantic croaker *(Micropogonias undulatus)*, blue crab, bay anchovy, white shrimp *(Litopenaeus setiferus*), spot *(Leiostomus xanthurus)*, hardhead catfish *(Ariopsis felis)*, sand seatrout *(Cynoscion arenarius)*, brief squid *(Lolliguncula brevis)*, least puffer *(Sphoeroides parvus)*, Gulf menhaden *(Brevoortia patronus)*, gafftopsail catfish *(Bagre marinus)*, and Atlantic bumper *(Chloroscombrus chrysurus)* (Rogers *et al.* 1994, 1997).

The most abundant finfish species collected by LDWF otter trawls from 1998 to 2008 in the Lake Mechant area were bay anchovy, Atlantic croaker, spot, Gulf menhaden, and sand seatrout (USACE 2010). White shrimp, blue crab, and brown shrimp were also collected by otter trawls. LDWF gillnets in the Catfish Lake area frequently collected spotted seatrout *(Cynoscion nebulosus)*, Gulf menhaden, spot, Atlantic croaker, hardhead catfish, and black drum *(Pogonias cromis)*. The most abundant species collected by LDWF seines in Lake Boudreaux were bay anchovy, inland silverside, naked goby *(Gobiosoma bosc)*, Atlantic croaker, and Gulf killifish *(Fundulus grandis)*. Grass shrimp, brown shrimp, blue crab, and white shrimp were also commonly collected in the seines (USACE 2010).

Freshwater and intermediate marshes in and around the project area also provide habitat for freshwater recreational and commercial fisheries species. Freshwater species include largemouth bass *(Micropterus salmoides)*, yellow bass *(Morone mississippiensis)*, black crappie *(Pomoxis nigromaculatus)*, bluegill *(Lepomis macrochirus)*, redear sunfish *(L. microlophus)*, warmouth *(L. gulosus)*, blue catfish *(Ictalurus furcatus)*, channel catfish *(I. punctatus)*, buffalo *(Ictiobus* sp.*)*, freshwater drum *(Aplodinotus grunniens)*, bowfin *(Amia calva)*, and gar *(Lepisosteus* sp.*)*.

Marshes in the area support many commercially and recreationally important marine fish and shellfish species including red drum *(Sciaenops ocellatus)*, black drum, sheepshead *(Archosargus probatocephalus)*, striped mullet, southern flounder *(Paralichthys lethostigma)*, Gulf menhaden, sand seatrout, gray snapper *(Lutjanus griseus)*, Spanish mackerel *(Scomberomorus maculatus)*, white shrimp, brown shrimp, blue crab, eastern oyster *(Crassostrea virginica)*, and Gulf stone crab *(Menippe adina).*

Brown and White Shrimp

The greatest percentage of shellfish landed in Louisiana in 2009 was brown and white shrimp. In Louisiana, nearly 34.5 million pounds of brown shrimp and 79.1 million pounds of white shrimp were landed in 2009, with a dockside value of $26.2 million and $94.1 million, respectively (NMFS 2011).

Brown and white shrimp spawn in the Gulf of Mexico. Postlarval shrimp are transported into estuarine waters and coastal wetlands. Brown shrimp generally enter estuaries from February to April (White and Boudreaux 1977); white shrimp enter from late spring to autumn (Baxter and Renfro 1967). White shrimp typically spawn in shallower Gulf waters; postlarval and juvenile white shrimp move farther inshore than brown shrimp (Turner and Brody 1983). Juvenile shrimp move from the estuaries into offshore waters where they become adults. Brown shrimp migrate from the estuaries to the Gulf from May to August (Lassuy 1983); white shrimp migrate offshore from September to December (Muncy 1984).

Blue Crab

The blue crab is another important Louisiana shellfish. In 2009, over 51.2 million pounds of blue crab was landed in Louisiana, with a dockside value of $36.4 million (NMFS 2011). Soft shell (postmolt) and peeler (pre-molt) blue crab landings in Louisiana made up a smaller percentage of the landings but had a higher price per pound (nearly 35 thousand pounds with over $93 thousand dockside value, and over 171 thousand pounds with $436 thousand dockside value, respectively) (NMFS 2011).

A significant recreational fishery for blue crab also exists; however, little data are available. Since the mid- to late-1950s, crab traps (or pots) have become the primary gear type used to capture hard crabs (Adkins 1972). Large numbers of blue crabs are also collected by commercial and recreational trawling. The number of crab captured by trawls is unknown, but may be quite high. One commercial shrimper trawling in the mouth of a deep bayou after a strong cold front reported catching eight to nine thousand pounds of crabs in one day (Adkins 1972).

Blue crabs are found throughout estuaries and in adjacent marine waters. Crabs mate during the warmer months in fresher waters (Darnell 1959). Sperm transferred to female crabs can remain viable for over a year and can be used for multiple spawnings (Perry and McIlwain 1986). Female crabs migrate southward to higher salinity waters after mating (Adkins 1972; Perry 1975). Spawning and larval development occur in the more saline waters (Darnell 1959).

Larval blue crab abundances peak during February and March (Adkins 1972); megalopae then enter fresher areas. Juvenile crabs prefer areas with soft, mud substrate and are most abundant from November to May, more frequently in the northern portions of estuaries. After 1 to 1.5 years, crabs move from shallow areas into larger bays and bayous as adults where they reside for at least one more year (Adkins 1972). Recruitment of blue crabs in some areas is highest during the late spring, early summer, and fall. Male and female crabs are distributed differently in relation to salinity. Adult male crabs may prefer lower salinity waters, whereas mature females prefer higher salinities (Perry and McIlwain 1986). Adult male crabs are frequently observed in rivers and lakes miles from the Gulf.

Eastern Oyster

The eastern oyster is an important resource in the Terrebonne Estuary. Over 14.7 million pounds of oysters were harvested in Louisiana in 2009, with a dockside value of more than $49.9 million (NMFS 2011). The central coast of Louisiana, including the Terrebonne Estuary, supplies 26 percent of Louisiana oyster landings (Keithly and Roberts 1988).

Oyster leases are primarily located in the southern portion of the project area. Oyster seed grounds near the project area are located in Caillou (Sister) Lake and Bay Junop at the southern end of Bayou du Large. Seed grounds are managed by the LDWF to produce a ready supply of seed oysters for placement on private leases for later harvest. Active oyster leases in the vicinity of the study area in 2009 are shown in Figure 5-7.

Salinity affects oyster distributions, and very low salinities can cause oyster mortalities, although the low salinity tolerance of oysters has been subject to debate. Adult oysters are typically found within a salinity range of 10 to 30 ppt in estuaries in the Gulf; however, oysters can tolerate 2 to 40 ppt (Stanley and Sellers 1986). The susceptibility of oysters to low salinities may depend on the previous condition of the oyster (fatness), the length of exposure time, and the water temperature (Gunter 1953). Lower temperatures are generally positively correlated with the quality or condition of the oysters (Owen and Walters 1950). Oyster abundance appears to increase one or two years after periods of increased freshwater inflow; low abundances may occur one to three years after declines in freshwater inflow (Buzan *et al.* 2009).

Salinity also affects the distribution of oyster predators and parasites. Higher levels of parasitism generally occur in higher salinity waters (Gauthier *et al.* 2007). Susceptibility to infection by the protozoan *Perkinsus mannus* in oysters is significantly and positively correlated with salinity (Chu *et al.* 1993; Chu and La Peyre 1993).

The southern oyster drill is an important predator of oysters. Oyster drill populations fluctuate due to environmental changes, such as changes in salinity or temperature (Brown *et al.* 2004). Oyster drills are typically found in the higher salinity portions of estuaries, where salinities are greater than 15 ppt (Butler 1954). However, the salinity at which mortality occurs fluctuates depending upon the salinity the oyster drills were accustomed to and how quickly the salinity declines (Butler 1985). Water temperatures below 12°C also have been found to limit oyster drill feeding (Butler 1985). Black drum *(Pogonias cromis)* also prey on oysters (Brown *et al.* 2003) and are likely to be more abundant in higher salinity areas in the northern Gulf of Mexico.

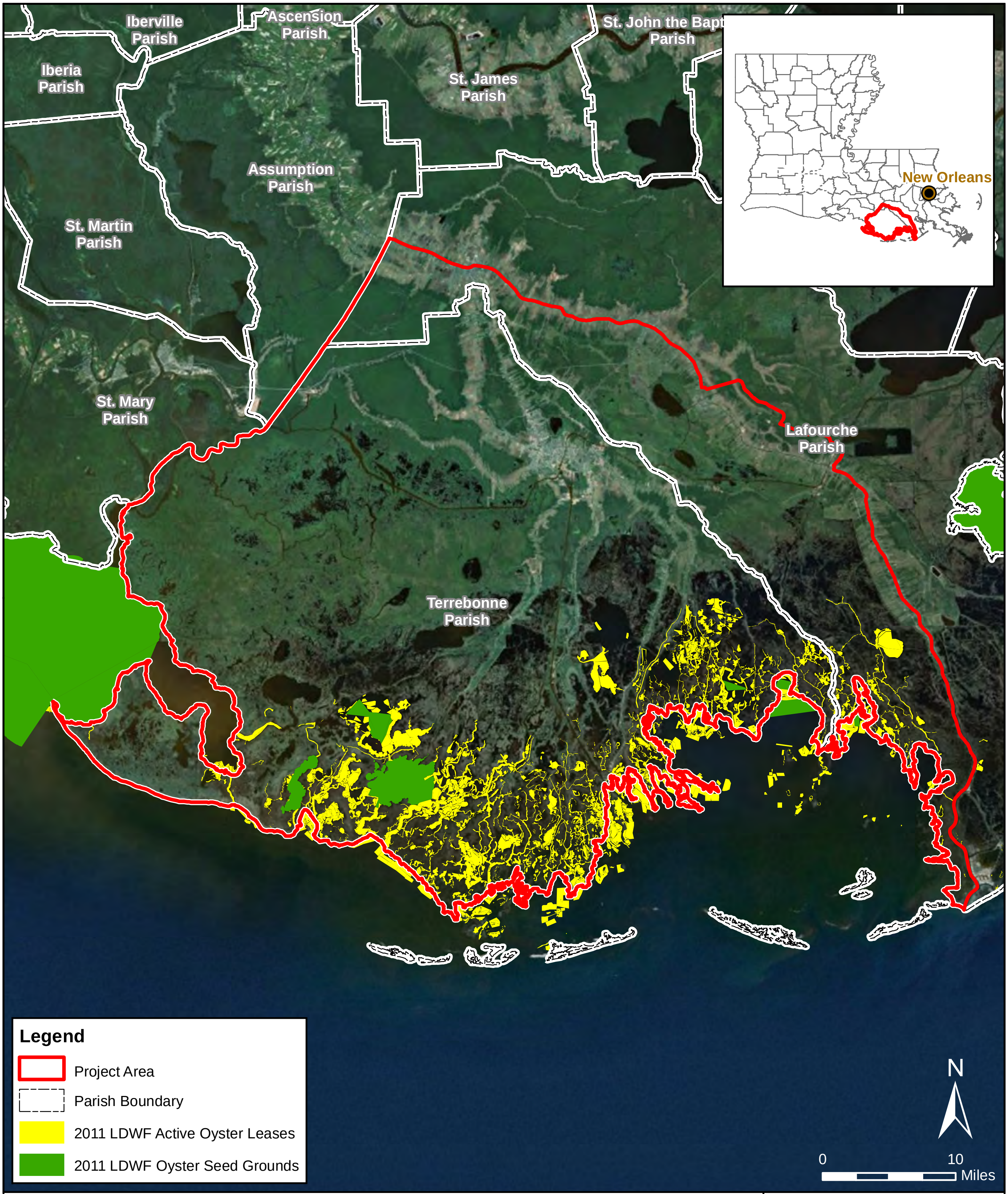

Figure 5-7. 2011 Louisiana Department of Wildlife and Fisheries Active Oyster Leases and Oyster Seed Grounds

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Revised Programmatic Environmental Impact Statement

ESRI World 2D Imagery

Gulf Engineers & Consultants

Figure: 5-7
Date: June 2012
Scale: 1:636,789
Source: NRCS/GEC
Map ID: 273160010-2815

5.2.5 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, or growth to maturity for species regulated under a Federal fisheries management plan.

Specific categories of EFH in estuaries include all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities), including the sub-tidal vegetation (sea grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). The Gulf of Mexico Fishery Management Council (GMFMC), through the generic amendment of the Fishery Management Plans for the Gulf of Mexico, lists the following Federally managed species or species groups potentially found in coastal Louisiana: brown shrimp, white shrimp, red drum and Spanish mackerel (GMFMC 2005). Coastal wetlands provide nursery and foraging habitat that supports economically important marine fishery species such as spotted seatrout, southern flounder, Atlantic croaker, Gulf menhaden, striped mullet, and blue crab. These species serve as prey for other federally managed fish species such as mackerels, snappers, groupers, billfishes, and sharks. EFH encompasses all the wetlands and bays along the Louisiana coast.

The expected salinity zones in the project area and the abundance of these managed species are listed in Table 5-6. The EFH for life stages of these managed species are listed in Table 5-7. No Habitat Areas of Particular Concern (HAPCs) are located within or near the project site. An EFH assessment conducted previously for the project area is incorporated by reference (USACE 2002, http://www.mvn.usace.army.mil/prj/mtog/).

Table 5-6. Salinity Zones and Abundance of Federally Managed Species in Terrebonne/Timbalier Bays

Salinity Zone	Life Stage	Brown Shrimp	White Shrimp	Red Drum
0 - 0.5 ppt	Adults		*R*	*R*
	Eggs			
	Juveniles	*C to HA*	*R to C*	*R*
	Larvae			
	Spawners			
0.5 - 5 ppt	Adults	*R*	*R*	*R to C*
	Eggs			
	Juveniles	*C to HA*	*C to A*	*C*
	Larvae	*R to A*	*R to C*	*R*
	Spawners			
5 – 15 ppt	Adults	*R*	*R to C*	*R to C*
	Eggs			

Salinity Zone	Life Stage	Brown Shrimp	White Shrimp	Red Drum
	Juveniles	*C to HA*	*C to A*	*C*
	Larvae	*R to HA*	*R to A*	*R*
	Spawners			

Table 5-7. Essential Fish Habitat for Life Stages of Federally Managed Species in Terrebonne/Timbalier Bays

Species	Life Stage	Essential Fish Habitat
Brown shrimp	Adults	Gulf of Mexico <110 m, silt sand, muddy sand
	Juvenile	Marsh edge, submerged aquatic vegetation (SAV), tidal creeks, inner marsh
	Larvae/Postlarvae	0 to 82 m; pelagic
White shrimp	Adults	Gulf of Mexico <33 m, Silt, soft mud
	Juvenile	Marsh edge, SAV, marsh ponds, inner marsh, oyster reefs
	Larvae/Postlarvae	Planktonic, soft bottom, emergent marsh
Red drum	Adults	Gulf of Mexico & estuarine mud bottoms, oyster reef
	Juvenile	SAV, estuarine mud bottoms, marsh/water interface
	Juvenile	Sand/shell/soft bottom, oyster reef

EFH for the Red Drum Fishery Management Plan includes all estuaries: Vermilion Bay, Louisiana, to the eastern edge of Mobile Bay, Alabama, out to depths of 25 fathoms; Crystal River, Florida, to Naples, Florida, between depths of 5 and 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC) between depths of 5 and 10 fathoms (GMFMC 2005).

EFH for the Shrimp Fishery Management Plan includes all estuaries; the US/Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 100 fathoms; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 325 fathoms; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 35 fathoms, with the exception of waters extending from Crystal River, Florida, to Naples, Florida, between depths of 10 and 25 fathoms and in Florida Bay between depths of 5 and 10 fathoms (GMFMC 2005).

5.2.6 WILDLIFE

Wildlife resources are a critical element of various aquatic and terrestrial habitats; they are indicators of the health of various aquatic and terrestrial habitats, and many species serve as important commercial resources. The project area provides habitat for many species of wildlife, including waterfowl, wading birds, neotropical and migratory birds, deer, furbearers, reptiles, and amphibians. The public places a high priority on the aesthetic, recreational, and commercial value of wildlife. Coastal wetlands provide habitats used for nursery, cover, feeding, roosting, shelter and other requirements. Wildlife resources are discussed in greater detail in the 2002 Morganza to the Gulf PEIS, which is incorporated herein by reference (USACE 2002).

Birds

Over 200 species of birds, including 35 species of waterfowl, have been reported in the Barataria-Terrebonne estuary (Condrey *et al.* 1995, Mitchell 1991). Species diversity decreases as the salinity increases; the greatest numbers of bird species occur in the freshwater swamps. Louisiana’s coastal wetlands and marshes provide winter habitat for more than 50 percent of the duck population of the Mississippi Flyway. Waterfowl populations vary greatly from year to year. Waterfowl are primarily winter residents and migrate north in the spring and summer. In freshwater marsh, the American coot and blue-winged teal are the most prevalent species (Sasser *et al*. 1982). Gadwall, American coot, mallard, and blue-winged teal are the most abundant species in salt and brackish marshes. Puddle ducks inhabit marshes with shallow (less than half a meter deep) ponds; they prefer pondweed, naiad, and duckweed in freshwater areas and widgeongrass in brackish marsh. Diving ducks, such as scaup, prefer deeper water and often dive more than 10 meters underwater to feed on invertebrates (Gosselink 1984).

Louisiana’s coastal wetlands are an important habitat for millions of neotropical and other migratory avian species such as wading birds, shorebirds, rails, gallinules, and numerous songbirds. The coastal wetlands provide migratory birds an essential stopover habitat on their migration route.

A 2001 survey reported 197 shorebird colonies of wading birds and seabirds (representing 215,249 pairs of nesting birds) in coastal Louisiana (Michot *et al*. 2003). Species of wading birds likely to inhabit the project area include: great blue heron, little blue heron, tricolored heron, green heron, yellow crowned night heron, black crowned night heron, tri-colored heron, white-faced ibis, white ibis, roseate spoonbill, great egret, cattle egret, and snowy egret. These birds are generally carnivorous, with a diet consisting primarily of frogs, small fish, snakes, crawfish, worms, and insects found in shallow ponds and along bayous. Brackish marshes are their preferred feeding areas (Gosselink 1984). Colonies tend to be located in wooded and shrub swamps, which typically flood during the nesting season (Mitchell 1991).

Numerous species of seabirds and shorebirds inhabit shallow water areas and mudflats. Seabirds commonly nest on barrier and bay islands on shell, sand, or bare soil (Mitchell 1991). Seabirds likely to inhabit the project area include the brown pelican, white pelican, laughing gull, herring gull, and several species of terns. Shorebirds likely to utilize the project area include killdeer, willet, black-necked stilt, American avocet, dowitchers, common snipe, and various species of terns.

Other bird species common in the project area include red winged black bird, boat-tailed grackle, seaside sparrow, osprey, northern harrier, belted kingfisher, and marsh wrens. Game birds, excluding migratory waterfowl, likely to be present in the study area include the clapper rail, Virginia rail, sora, American coot, and common snipe. Raptor species that could be present in the study area include red tailed hawk, red-shouldered hawk, osprey, American kestrel, screech owl, northern harrier, Mississippi kite, great horned owl, and barred owl. Bald eagles are known to be present within the study area.

Species Recently Delisted as Threatened or Endangered

The brown pelican was removed from the USFWS endangered species list on December 17, 2009 (Federal Register, Volume 74, Number 220, November 17, 2009) due to successful recovery efforts. The brown pelican is still protected under the Migratory Bird Treaty Act.

Brown pelicans nest in colonies on small coastal islands in salt and brackish waters. Nesting islands are often chosen near channels where shipping and shrimping operations make fish easily available to nesting pairs (USACE 2004). They were reintroduced into Louisiana from Florida from 1968 to 1980, and nesting populations were established on North Island in the Chandeleur Islands. In 2000, Chandeleur Island nesting populations were relocated to the mouth of Baptiste Collette Pass, but the birds returned to the Chandeleur Islands. Other nesting areas in Louisiana are Raccoon and Wine Islands in the Isles Dernieres barrier island system, Queen Bess Island in Barataria Bay, West Breton Island in Breton Sound, and most recently, Rabbit Island in Calcasieu Lake (USACE 2004). Additional information on the brown pelican can be found at http://www.fws.gov/endangered.

Bald eagles were removed from the USFWS endangered species list on August 8, 2007 (Federal Register, Volume 72, Number 130, July 9, 2007) because their populations recovered sufficiently. However, this species is still protected under the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Lacey Act. The USFWS developed the National Bald Eagle Management (NBEM) Guidelines to provide landowners, land managers, and others with information and recommendations regarding how to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance", which is prohibited by the Bald and Golden Eagle Protection Act. A copy of the NBEM Guidelines is available at: www.fws.gov/migratorybirds/issues/BaldEagle.

The bald eagle occurs in the Lafourche Parish portion of the study area. According to the USFWS Fish and Wildlife Coordination Act (FWCA) Report for the 2002 Morganza to the Gulf PEIS, at least 30 bald eagles nests (present and historical) have been documented in the study area (USACE 2002). This species prefers habitat near large rivers, lakes, and estuaries with large trees in fairly open stands required for roosting and nesting. In southeastern Louisiana, nests are often built in large bald cypress trees that are located near fresh to intermediate marshes or open water (USACE 2004). Additional information on bald eagles can be found at http://www/fws.gov/midwest/eagle/.

Reptiles

Species of reptiles that are likely to inhabit the project area include: American alligator (*Alligator mississippiensis*), alligator snapping turtle (*Cheldrya serpetina*), eastern box turtle (*Terrapene carolina*), water moccasin (*Agkistrodon piscivorus*), eastern mud snake (*Farancia abacura*), bullfrog (*Rana catesbeiana*), southern leopard frog (*Lithobates sphenocephalus*), and Gulf Coast toad (*Incilius valliceps*).

The alligator was removed from the USFWS endangered species list in 1987. Alligators are common in fresh to brackish bayous and lakes (Joanen and McNease 1972, Platt *et al*. 1989). Their diet consists of a broad range of prey including insects, crawfish, crab, birds, fish, muskrat, nutria, turtles, shrimp, and snails (Chabreck 1971). Marshes with salinities less than 10 ppt are preferred nesting sites (Gosselink 1984).

Fur Bearers

Coastal Louisiana has a long history of being an important fur producing area in North America. The nutria, mink, muskrat, raccoon, and river otter could be present in the project area. Louisiana's coastal marshes also provide habitat for important game species such as the whitetail deer (*Odocoileus virginianus*) and swamp rabbit (*Sylvilagus aquaticus*).

The muskrat (*Ondatra zibethicus*) is primarily found in brackish marshes. The muskrat eats one third of its weight per day (about 0.3 kg/day) (O'Neil 1949); this equates to about one percent of plant production. Nest-building and digging cause more marsh deterioration than feeding activities.

Invasive Species

In Louisiana, the nutria (*Myocastor coypus*) and feral hog (*Sus scrofa*) are the only two mammals considered invasive species. The nutria is also listed as an aquatic invasive species, see below. Nutria are large, herbivorous, aquatic mammals that inhabit fresh, intermediate, and brackish marshes and wetlands. Nutria are extremely prolific; in one year, a female can produce two litters and be pregnant for a third. Large numbers of nutria can be detrimental to wetland vegetation and exacerbate coastal land loss. During feeding, nutria graze on the base of plant stems and dig for roots and rhizomes in the winter. Grazing can strip patches of vegetation throughout the marsh and their digging overturns the marsh's upper layer. This can result in a loss of vegetation leading to a conversion of marsh habitat to open water called "eat-outs" (USGS 2000). Historically, demand for nutria fur held populations in check. After 1989, the price of the pelts plummeted and population numbers increased dramatically. In 2002, the Coastwide Nutria Control Program was approved under the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA). This program was designed to encourage nutria harvesting through monetary incentives.

Large populations of feral hogs are present in Louisiana. Feral hogs are the most prolific mammal in North America. Their reproductive rates can exceed four times that of native ungulate species. They damage habitats and impact native plant and animal species. Feral hogs contribute to soil erosion, leaching of minerals and nutrients, habitat destruction, native plant species destruction, exotic plant species introduction, habitat destruction, and changes in vegetative success rates. Native wildlife are impacted though direct competition for food and predation of native amphibians, reptiles, mammals, and ground-nesting birds. Feral hogs provide some economic and social benefits through hunting (USFWS 2009, 2010).

Aquatic invasive species likely to be in the project area are presented in Table 5-8.

Table 5-8. Aquatic Invasive Species Likely to be in the Project Area

Common Name	Scientific Name	Problems	Current Range
Nutria	*Myocastor coypus*	Feeds on vegetation causing erosion, burrows in banks of canals and bayous weakening levees, destroys habitat.	Distributed along the coastal areas of the Gulf states.
Silver carp	*Hypophthalmichthys molitrix*	Competes with native fish and shellfish, potential injuries to fishermen and boats.	States bordering Mississippi River, including Louisiana and the Barataria-Terrebonne system.
Bighead carp	*Hypophthalmichthys nobilis*	Alters phytoplankton and zooplankton communities.	States bordering Mississippi River, including Louisiana and the Barataria-Terrbonne system.
Black carp	*Mylopharyngodon piceus*	Threatens native shellfish and mollusks, potential host of parasites and flukes.	Specimens identified in Louisiana but no known established populations in Louisiana.
Asian clam	*Corbicula fluminea*	Outcompetes native species, is a known fouling agent, can alter benthic substrate.	Southern Louisiana, including the Barataria-Terrebonne system. Also documented in 38 other states.
Zebra mussel	*Dreissena polymorpha*	Clogs industrial and municipal intake pipes.	In Louisiana, established in Mississippi River throughout the state. Present in the Barataria-Terrebonne system.
Apple snail	*Pomacea* spp.	Voracious eater of soft vegetation, causing devastating effects on crops such as rice.	In Louisiana, Plaquemines and Terrebonne parishes.
Australian spotted jellyfish	*Phyllorhiza punctata*	Impacts to Gulf of Mexico fisheries.	Caribbean and Gulf of Mexico, including the coastal waters of Louisiana and the Barataria-Terrebonne system.

Source: Barataria-Terrebonne National Estuary Program, 2011
http://www.btnep.org/subsites/Invasive/oldcontent/invasivesinla/aquaticanimals.aspx

5.2.7 THREATENED AND ENDANGERED SPECIES

Federally threatened (T) and endangered (E) species present in Terrebonne and Lafourche parishes are listed in Table 5-9. In a letter to CEMVN dated March 18, 2002, NMFS listed five federally protected whale species potentially occurring in the Gulf of Mexico off Louisiana, including the North Atlantic right whale (*Eubalaena glacialis*), the sei whale (*Balaenoptera borealis*), the finback whale (*Balaenoptera physalus*), the humpback whale (*Megaptera novaengliae*), and the sperm whale (*Physeter macrocephalus*). However, according to the NMFS letter, none of these species is expected to be found near the project area (Appendix A).

Table 5-9. Threatened and Endangered Species in Terrebonne and Lafourche Parishes

Species		Status	
Scientific Name	**Common Name**	**Federal**	**State**
Haliaeetus leucocephalus	Bald eagle	Delisted	E
Pelecanus occidentalis	Brown pelican	Delisted	E
Falco peregrinus	Peregrine falcon	Not listed	T/E
Charadrius melodus	Piping plover	T; Critical Habitat	T/E

Source: USFWS, June 2011 (http://www.fws.gov/endangered/); LDWF, June 2011 (http://www.wlf.louisiana.gov/wildlife).

Federal and State Listed Species In or Near the Study Area

To provide compliance with Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended, a Biological Assessment (BA) was prepared pursuant to the ESA and implementing regulation (50 CFR 402.14) (Appendix A). The BA provides an assessment of the effects of the project on the protected species in the vicinity of the project. Coordination with USFWS and NMFS is on-going.

According to the 2002 BA (Appendix A), the piping plover, the Gulf sturgeon, and Kemp’s ridley sea turtle may occur in or near the study area. Four additional species of endangered or threatened sea turtles, including the hawksbill, leatherback, green, and loggerhead, were listed in the BA, but cited as unlikely to occur near the study area. Additional information on sea turtles located in the Gulf of Mexico can be found at http://www.nmfs.noaa.gov/. The bald eagle and the brown pelican were also listed as protected species in the study area in the 2002 BA. However, due to successful recovery efforts, both species were removed from the Federal list of threatened and endangered species. The wildlife section above provides more details about these species. Information on threatened and endangered species discussed in the BA, FWCA Report, and the Draft Feasibility Report and FPEIS, is incorporated herein by reference.

<u>Piping plover</u> The federally threatened piping plover breeds in northern latitudes and winters along the south Atlantic and Gulf coasts, including coastal Louisiana. Overwintering populations in Louisiana occur on intertidal beaches, sand flats, mud flats, algal flats, wash-over passes with sparse emergent vegetation; they also require unvegetated or sparsely vegetated areas for roosting in Cameron, Jefferson (Grand Terre Island and Grand Isle), Vermilion, Lafourche, Plaquemines and St. Bernard parishes. Additionally, they occur on the Isles Dernieres barrier island chain in Terrebonne Parish. The piping plover begins arriving on the wintering grounds as early as late July and remains until late March or April (USACE 2010).

On July 10, 2001, the USFWS designated critical habitat for breeding and wintering piping plovers (Federal Register Volume 66, No. 132). The barrier islands south of the project area in the Gulf of Mexico have been designated as critical habitat for the piping plover. Their designated critical habitat identifies specific areas that are essential to the conservation of the species. Additional information on the piping plover and their critical habitat can be found at http://www.fws.gov/plover/facts.html.

<u>Gulf sturgeon</u> The Gulf sturgeon, federally listed as a threatened species under both the USFWS and NMFS, is anadromous and occurs in many rivers, streams, and estuarine waters along the northern Gulf Coast between the Mississippi River and the Suwannee River in Florida. In Louisiana, the Gulf sturgeon has 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. Sturgeons, 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 overfishing have adversely affected the species (USACE 2010).

On March 19, 2003, the USFWS and the 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. No critical habitat occurs within or in proximity to the project area. Additional information on the Gulf sturgeon can be found at http://www.fws.gov/endangered/ and http://www.nmfs.noaa.gov/.

<u>Kemp's ridley sea turtle</u> Kemp's ridley turtles inhabit shallow nearshore and inshore waters of the northern Gulf of Mexico, particularly in Louisiana. This small sea turtle is believed to be the most frequently encountered, if not the most abundant sea turtle, off the Louisiana coast (USACE 2004). Kemp's ridleys are often found in salt marsh waterbodies and have been collected in Louisiana from Lake Borgne, Barataria and Terrebonne Bays, and near Calcasieu Pass. Occurrence of these sea turtles in bays and estuaries along the Louisiana coast would not be unexpected, as many of their primary

food items occur there. During winter, turtles in the northern Gulf of Mexico may migrate to deeper water. Hatchlings often become entrained in Gulf of Mexico eddies, where they are dispersed by oceanic surface currents and then enter coastal shallow water habitats when they reach about 20 cm in length (USFWS and NMFS 1992). Additional information can be found at http://www.fws.gov/endangered/ and http://www.nmfs.noaa.gov/.

5.2.8 NOISE

Noise is defined as unwanted sound and, in the context of protecting public health and welfare, implies potential effects on the human and natural environment. Noise is a significant concern associated with construction, dredging, and transportation activities and projects. Ambient noise levels within a given region may fluctuate over time because of variations in intensity and abundance of noise sources.

The USEPA has established noise guidelines recommending noise limits for indoor and outdoor noise activities. Under these guidelines, an average noise level over a 24-hour period of 70 A-weighted decibels (dBA) is listed as the threshold for hearing loss. An outdoor 24-hour average sound level of 55 dBA is recommended for residential areas. Additionally, the U.S. Department of Housing and Urban Development (HUD) has also developed a noise abatement and control policy codified in 24 CFR Part 51. According to HUD policy, noise at or below 65 dBA is acceptable in all situations, noise between 65 and 75 dBA is generally acceptable, and noise exceeding 75 dBA is unacceptable in all situations. Noise monitoring and impacts are typically evaluated by the local government.

The study area is primarily rural, but does include areas with urban and industrial development, including Houma, Thibodeaux, Raceland, and LaRose Metropolitan Statistical Areas (MSAs). Ambient noise in the area is generated by a broad range of sources, both natural and anthropogenic. Natural noise sources include climatic sources, such as thunder, wind, and precipitation. Potential sources of anthropogenic sound include commercial shipping, dredging and construction activities, agricultural activities, industrial activities, outdoor recreation (e.g. hunting and fishing), and commercial and residential waterborne and highway traffic. No ambient noise monitoring appears to have been conducted in the study area; consequently, no quantitative data on noise levels within the study area are available for analysis.

5.2.9 AIR QUALITY

The USEPA's AirData database contains measurements of air pollutant concentrations for the entire United States. The measurements include both criteria air pollutants and hazardous air pollutants as compared to the NAAQS specified by the USEPA. The AirData database was queried for air quality data in Terrebonne and Lafourche parishes for the interval 2002-2008 (the most recent year that data are available). The data show that air quality in these parishes for all criteria pollutants for the 2002-2008 period was better than the NAAQS at all monitoring sites, with the exception of 8-hour ozone in Lafourche Parish during the years 2003 to 2007.

The USEPA's *Nonattainment Areas for Criteria Pollutants* (Green Book) maintains a list of all areas within the United States that are currently designated nonattainment areas with respect to one or more criteria air pollutants. Terrebonne and Lafourche parishes are not listed as non- attainment areas in the Green Book, indicating they are currently classified as attainment areas.

Lafourche Parish was previously designated as non-attainment with respect to one-hour ozone NAAQS beginning in September 1978; however, because the parish met one-hour ozone NAAQS from 1997 to 2001, EPA approved the redesignation to attainment for one-hour ozone in December 2001. The parish has continued to meet one-hour ozone NAAQS since that time.

In 2004, EPA designated and classified areas for the new eight-hour ozone NAAQS and published the final Phase I rule for implementation of the eight-hour ozone NAAQS. Lafourche Parish was classified as unclassifiable/attainment for the eight-hour ozone NAAQS at that time. In 2006, the United States Court of Appeals vacated those portions of EPA's Phase I implementation rule that allow for regulation of eight-hour ozone non-attainment areas. In EPA's proposed reclassification of areas in January 2009, Lafourche Parish was not proposed as a non-attainment area for eight-hour ozone; however, in March 2009, the Louisiana Department of Environmental Quality recommended to EPA that the designation for Lafourche Parish be changed to a non-attainment status for eight-hour ozone due to recent exceedances of the NAAQS. Until the reclassification of areas is finalized, areas would remain classified in the Green Book according to the 2004 Subpart 1 portion of the Phase I rule. A revised maintenance plan for eight-hour ozone was submitted to EPA for Lafourche Parish in 2006 and approved by EPA in 2008, per Section 110 of the Clean Air Act. The Lafourche Parish maintenance areas, however, are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. The EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard. In a telephone communication with the Louisiana Department of Environmental Quality on March 19, 2013, it was noted that the maintenance plan for Lafourche Parish was lifted in 2004. It was also confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to conform to the *de minimis* levels of emissions.

The AirData database also provides annual summaries of Air Quality Index (AQI) values for counties or MSAs. The AQI is an approximate indicator of overall air quality because it takes into account all of the criteria air pollutants measured within a geographic area. The AQI summary values include both qualitative measures (i.e., days of the year having good air quality) and descriptive statistics (i.e., median AQI value). According to AQI summary for Terrebonne and Lafourche Parishes and for the Houma MSA for the interval 2002-2008, air quality in the majority of the study area (Terrebonne Parish /Houma MSA) is good, with minimal periods when air quality is classified as unhealthy. In the small portion of the study area that lies within Lafourche Parish, air quality is average to above average. Of the six criteria air pollutants, ozone and particulate matter of 2.5 µm or less are most likely to occur within the study area.

Land use in the study area is comprised primarily of coastal wetlands, agricultural/ sugar cane production, and urban areas, which include Houma, Thibodeaux, Raceland, and LaRose MSAs.

5.2.10 HYDROLOGY

Storm Surge and Flooding

The highest flood stages and flood damages in the study area are influenced by storm surges and high tides due to tropical storms and hurricanes. Storm surges push seawater from the Gulf of Mexico and increase the salinity in the study area. The following tropical storms have been most influential in the study area in terms of significant storm surge flooding (Roth 2010):

- Hurricane Flossy, September 24, 1956: Storm surge reached five to eight feet across the southeastern Louisiana coast. The highest storm surge was 13 feet at the Ostrica Lock. Rain totals were excessive across southeast Louisiana, with a maximum of 16.7 inches at Golden Meadow.

- Hurricane Hilda, October 23, 1964: Hurricane Hilda caused extensive tidal and headwater flooding in the study area. Storm surge caused a flood depth of 7.8 feet in Cocodrie and 10 feet at Point Au Fer.

- Hurricane Betsy, September 9-10, 1965: Storm surge reached 15.7 feet in Grand Isle, Louisiana. The Mississippi River rose more than 10 feet at New Orleans and crested at 15.5 feet at Baton Rouge. The highest recorded rainfall was 12.2 inches in New Orleans.

- Hurricane Carmen, September 7-8, 1974: Storm surge reached four to six feet in Terrebonne and Lafourche parishes. The highest recorded storm surge was 11.6 feet in Cocodrie.

- Hurricane Danny, August 15-16, 1985: Hurricane Danny strengthened into a hurricane on August 15th just offshore of Louisiana. Storm surge of eight feet was seen along the coast of south-central Louisiana.

- Hurricane Juan, October 27-31, 1985: Storm surge reached eight feet at Cocodrie. Levees were overtopped in Lockport, Marrero, Oswego, and Myrtle Grove.

- Hurricane Andrew, August 26, 1992: Storm surge of 7.65 feet NGVD 88 was recorded at Round Bayou at Deer Island and 6.8 feet at Morgan City.

- Tropical Storm Allison, June 4-11, 2001: Thibodaux recorded 29.9 inches of rainfall. Portions of Thibodaux, Lafayette, New Orleans, and Baton Rouge saw severe flooding.

- Hurricane Gustav, August 31-September 3, 2008: Storm surge of 9 – 10 feet was observed in southeast Louisiana. Heavy rains fell in south-central Louisiana. The highest recorded rainfall was 21 inches at Larto Lake.

Existing Hydrology

Anthropogenic changes within the study area have altered the natural hydrology. Canals, pipelines, roads, railroads, navigation channels, and levees have altered the natural flow patterns. The study area has 39 forced drainage systems, where excess stormwater is removed by drainage canals and pump stations. One of these canals, the HNC, has been implicated in higher salinity in the Houma area.

Some of the natural bayous in the study area include Bayou du Large, Bayou Grand Caillou, Bayou Terrebonne, Bayou Pointe aux Chenes, and Bayou Lafourche (Figure 3-1). These bayous and their natural levees were formed by overflows from the Mississippi River.

Historically, freshwater inflows within the study area were driven by the Atchafalaya River and Bayou Lafourche. The connection between Bayou Lafourche and the Mississippi River was in the process of naturally closing when construction of the levees along the Mississippi River closed off that connection. With the closure at Bayou Lafourche, the inflow of fresh water into the central and eastern portions of the project area was limited to local runoff. The natural ridge along Bayou Black restricts the flow along the northern boundary of the study area.

Today, flows within the study area are driven by stages in the lower Atchafalaya River. The major flow channels in the study area are the Atchafalaya River, the GIWW, and the HNC. High stages in the lower Atchafalaya River force flows northeast through the Avoca Island Cutoff into the GIWW and Bayou Penchant (Figure 3-1). Additional flow enters the GIWW through Bayou Boeuf. Water travels eastward along the GIWW, with a portion of this water leaving the GIWW through channels and bayous, such as Bayou Copasaw. At Houma, the GIWW intersects the HNC. At this point, the majority of flow travels down the HNC to the Gulf of Mexico. Most of the study area is influenced by tidal movement from the Gulf of Mexico.

Hydrologic Dynamics of the System

In addition to the anthropogenic changes that have influenced the natural hydrology, the study area continues to have land loss. RSLR affects study-area marshes by gradually inundating marshes, which eventually convert to open water due to the depth of submergence. Subsidence and eustatic sea-level rise are and would continue to be a very dynamic system.

5.2.11 WATER QUALITY

Clean Water Act Section 305(b) listings of study area subsegments, from 1996 to 2010, were reviewed to determine the most prevalent water quality issues present in the study area and to determine which water quality parameters should be summarized for the depiction of historical water quality for the study area. Between 1996 and 2010, the most common suspected cause of impairment was low dissolved oxygen, followed by fecal coliform, non-native aquatic plants, total phosphorus, nitrate plus nitrite nitrogen, and nutrients. The most common suspected source of impairment was wastewater treatment package plants and other permitted small discharges, followed by introduction of non-native organisms, on-site treatment systems, total retention domestic sewage lagoons, unknown sources, and natural sources.

Historical water quality monitoring data were reviewed and summarized to determine water quality trends in the study area. Four (4) LDEQ long-term water quality monitoring stations exist in the study area. For dissolved oxygen, trends at all stations indicate that dissolved oxygen concentrations have improved between 1996 and 2010. Fecal coliform concentrations at all stations decreased over the same time period. Overall, mildly decreasing trends were observed for total phosphorus and Kjeldahl nitrogen at all stations. Nitrate plus nitrite levels showed very little change over the past thirty years. Overall, dissolved oxygen and fecal coliform levels have improved within the past thirty years.

Water and sediment samples were collected from a total of 12 sites between January 31 and February 2, 2011 to ensure proposed dredged material disposal activities associated with the proposed project do not have adverse environmental effects on the receiving aquatic environment. Evaluation of water and elutriate chemistry is typically performed to determine whether the proposed discharge of dredged material effluent exceeds State and/or Federal water quality criteria outside of the State enforced mixing zone, and therefore may result in toxicity to water column organisms. Water and elutriate chemistry data were compared with applicable State and Federal water quality criteria to determine whether results exceeded these criteria. In most cases during this study, values exceeding criteria are not quantified concentrations, but are instead estimates, as results were below the laboratory reporting limit (in other words, the concentration was below that which the laboratory could quantify with confidence).

For freshwater sites the only exceedances for quantified values were for copper, iron, lead, and mercury. These quantified elutriate concentrations, which are for exceedances of chronic water quality criteria, were within one order of magnitude of criteria. Estimated results below the laboratory reporting limit when calculated as one half of the laboratory reporting limit, exceeded acute criteria for cadmium, hexachlorobutadiene, and the pesticides p,p’-DDD, and toxaphene; and chronic criteria for cadmium, mercury, pesticides p,p’-DDD, p,p’-DDT, endrin, heptachlor, heptachlor epoxide, methoxyclor, and toxaphene.

For brackish sites, the only quantified concentration exceeding criteria was ammonia. Estimated results below the laboratory reporting limit, when calculated as one half of the laboratory reporting limit, exceeded acute criteria for copper, silver, hexachlorobutadiene and pesticides p,p’-DDD, beta-endosulfan, endrin, and toxaphene; , and chronic criteria for copper, mercury, silver, hexachlorobutadiene, and pesticides p,p’-DDD, p,p’-DDT, dieldrin, alpha-endosulfan, beta-endosulfan, endrin, heptachlor, heptachlor epoxide, methoxychlor, and toxaphene.

For marine sites, no exceedances of quantified values were reported. Estimated results below the laboratory reporting limit, when estimated as one half of the laboratory reporting limit, exceeded acute criteria for silver, hexachlorobutadiene , and pesticides beta-endosulfan, endrin, and toxaphene; and chronic criteria for mercury, silver, hexachlorobutadiene , and pesticides p,p’-DDT, 4123 dieldrin, alpha-endosulfan, beta-endosulfan, endrin, heptachlor, heptachlor epoxide, methoxychlor, and toxaphene.

In sediment quality samples at freshwater sites, concentrations of arsenic, copper, nickel, and zinc exceeded freshwater Lowest Effect Level (LEL) screening values at all freshwater sites, while the measured concentration of mercury exceeded the freshwater LEL screening concentration at one site. Results below the laboratory reporting limit exceeded sediment screening values at all freshwater sites for a variety of organic and inorganic constituents.

For brackish sites sediment screening values were exceeded for quantified or estimated concentrations of aluminum, antimony, arsenic, barium, cobalt, copper, manganese, nickel, zinc, and several organic compounds. Results below the laboratory reporting limit, when estimated as one half of the laboratory reporting limit, exceeded sediment screening values for a variety of organic and inorganic constituents.

For marine sites, sediment screening values were exceeded for quantified concentrations of aluminum, arsenic, barium, cobalt, copper, manganese, nickel, and butyl benzyl phthalate. Results below the laboratory reporting limit, when estimated as one half of the laboratory reporting limit, exceeded sediment screening values for a variety of organic and inorganic constituents.

Greater and more specific detail on water and sediment quality can be found in the engineering appendix to the PAC report.

5.2.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE (HTRW)

The Final Phase I Environmental Site Assessment (ESA) for this project was conducted on 3 May 2011. The Phase I ESA identified 49 Recognized Environmental Conditions (RECs) in three areas of the proposed project right of way. The study identified 16 RECs in the area of the proposed Reach A, 22 RECs within the area of the proposed Reach B, and 11 RECs within the area of the proposed Reach C. In each of these reaches, several

RECs consisted of groups of oil and gas wells. In reaches B and C, groups of gas pipelines were identified.

In Reach A, the Phase I ESA identified a Small Quantity Generator within the Federal Resource Conservation and Recovery Act (RCRA-SQG), numerous above-ground storage tanks (ASTs) and pipelines connecting to the tanks, 26 steel drums, some apparently abandoned, another group of six empty 55-gallon steel drums, some nuisance dumping including household appliances, 30 former and present oil and gas wells within Reach A, and 36 former and present oil and gas wells within 500 feet of Reach A. All of the RECs identified could be easily avoided or removed. None of the identified RECs in Reach A would be likely to alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large.

In Reach B, the Phase I ESA identified 31 above-ground storage tanks (ASTs), numerous discarded 5-gallon drums, one marked and buried petroleum pipeline, some nuisance dumping, two ERNS facilities (ERNS, Emergency Response Notification System, is a database of oil and hazardous substances spill reports), 17 former and present oil and gas wells within Reach B, 19 former and present oil and gas wells within 500 feet of Reach B, 19 gas pipelines, and one old dump. All of the identified RECs could be easily avoided or removed. None of the identified RECs in Reach B would be likely to alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large.

In Reach C, the Phase I ESA identified 11 above-ground storage tanks (ASTs), one discarded 55-gallon plastic drum, one petroleum pipeline, 14 former and present oil and gas wells within Reach C, 19 former and present oil and gas wells within 500 feet of Reach C, and 15 gas pipelines. All of the identified RECs could be easily avoided or removed. None of the identified RECs in Reach C would be likely to alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large.

A Phase 1 Environmental Site Assessment (ESA) was completed in the area of the Lockport to Larose Ridge and the Larose Section C-North Variant reaches in 2010. However, because no site visit was conducted, the assessment did not fully comply with ASTME 1527-05 standards. The assessment found that some of the area is heavily industrialized and includes numerous businesses that are considered Small Quantity Generators and a few Large Quantity Generators. However, none of these sites have any recorded spills or discharges that would affect the proposed project. Numerous small discharges, mainly of diesel fuel, were recorded in the Emergency Response Notification System (ERNS), but none of these were of a magnitude that would affect the project area in a significant way. Based upon this limited investigation, there do not appear to be any Recognized Environmental Conditions (RECs) in or near the two eastern reaches that would affect the project, construction personnel working on the project, the public, or the natural environment within the project area. However, a site visit was not made for this programmatic feature.

In summary, existing or potential RECs were identified in and near the project, but there is a very low probability that HTRW would alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large. Before right of entry for construction is requested a fully compliant Phase I Environmental Site Assessment would need to be completed within six months of the start of construction. This updated phase I and site visit would occur during investigation of the supplemental NEPA document for the Lockport to Larose and Larose Section C-N reaches. If the project location or methods change, the HTRW probability may need to be re-investigated.

5.2.13 SOCIOECONOMICS

Population and Housing

Both Lafourche and Terrebonne parishes have experienced a steady increase in population over the last three decades. Table 5-10 shows recent historical population figures for Lafourche and Terrebonne parishes as well as communities in the study area. Between 2000 and 2010, Lafourche Parish increased from a population of 89,974 to 96,318, a gain of 6,344 residents. During the same period, Terrebonne Parish's population increased from 104,503 to 111,860, an increase of 7,357. Not all communities within Lafourche and Terrebonne parishes experienced population growth, however. For example, Table 5-10 shows that among the communities within the project boundaries, Lockport, Raceland, Chauvin, Dulac, and Montegut all experienced population decline during the 2000-2010 period. In contrast, communities within the two parishes that experienced population growth during this period include Thibodaux, Gray, Houma, and Schriever.

Housing trends in Lafourche and Terrebonne parishes have paralleled the parishes’ growth in population. For example, between 2000 and 2010, Lafourche Parish added an additional 3,537 housing units (from 35,045 to 38,582) and Terrebonne Parish added an additional 3,959 housing units (from 39,928 to 43,887).

Within the project boundaries, the total population in 2010 was 113,642. This includes the entire parish of Terrebonne and the portion of Lafourche Parish to the south and west of Bayou Lafourche. The total housing units included within the project boundaries in 2010 was 44,566.

Employment, Businesses, and Industrial Activity

In addition to commercial fishing and markets supporting recreational fishing and hunting, economic activities in the project area include the harvest of sugar cane, oil and gas production, the transport of these resources, the construction and maintenance of oil rigs, and commercial activities supporting the local communities. Table 5-11 summarizes selected business, industrial, and agricultural data for Lafourche and Terrebonne parishes as reported by the Bureau of the Census. In both parishes, education, health, and social services industries employ the largest number of workers, followed by retail trade.

The city of Houma, located in Terrebonne Parish, originally developed as a market center for fish, wildlife, and agricultural production; however, with the discovery of oil and gas and the technology to extract them from surrounding wetlands and waterbottoms, employment and income opportunities increased. By far the most important crop harvested has been sugar cane.

Table 5-10. Population Trends

Location	1980	1990	2000	2005-2009*	2010
Lafourche Parish	82,483	85,860	89,974	92,852	96,318
Lockport	2,424	2,503	2,630	2,634	2,578
Raceland	6,302	5,564	10,367	11,085	10,193
Thibodaux	15,810	14,125	14,320	14,276	14,566
Terrebonne Parish	94,393	96,982	104,503	108,277	111,860
Chauvin	3,338	3,375	3,075	2,925	2,912
Dulac	-	3,273	2,556	1,159	1,463
Gray	-	4,260	4,972	5,358	5,584
Houma	32,602	30,495	32,124	32,572	33,727
Montegut	-	1,784	1,710	1,474	1,540
Schriever	-	4,958	5,905	6,211	6,853

* The 2005-2009 American Community Survey population figures are based on data collected over the 2005-2009 period and represent an estimate of the average population over the 5-year period.

Sources: U.S. Census Bureau, 1980, 1990, 2000, 2010 Decennial Censuses;
2005-2009 American Community Survey.

Table 5-11. Number of Workers Employed in Selected Industries, 2000 and 2005-2009*

Industry	Lafourche Parish		Terrebonne Parish	
	2000	2005-2009	2000	2005-2009
Education, health, and social services	7,841	8,342	7,988	8,853
Retail trade	5,193	4,875	5,362	6,284
Construction	2,970	3,904	3,248	3,909
Manufacturing	4,928	4,500	3,437	4,466
Agriculture, forestry, fishing and hunting, and mining	3,066	3,730	4,916	5,623

* The 2005-2009 American Community Survey industry figures are based on data collected over the 2005-2009 period and represent an estimate of the average industry characteristics over the 5-year period.

Sources: U.S. Census Bureau, 2000 Decennial Census; 2005-2009 American Community Survey.

During the 1980s, however, the reduced demand for oil and gas and the availability at more competitive prices in other countries caused severe unemployment and out-migration in the area. During the 1990s the increased demand of oil, water resources, fish and wildlife for both commercial and recreational purposes, and national economic trends, appear to have contributed to the gradual economic recovery of the area. The economic and population gains witnessed in the city of Houma over the last two decades are largely the result of the sustained boom in the oil and gas industry.

Table 5-12 summarizes employment and income data for Lafourche and Terrebonne parishes as reported by the Bureau of the Census. As shown in the table, employment and income conditions in the two parishes improved between 2000 and the 2005-2009 period. Both parishes witnessed a decline in unemployment and an increase in both per capita personal income and median household income. For example, the estimated average median household income for Lafourche Parish in the 2005-2009 period was $46,196, up from $34,910 in the year 2000. Median household income in Terrebonne Parish increased from $35,235 to $47,338 during this same period.

Table 5-12. Employment and Income Characteristics, 2000 and 2005-2009*

Employment/Income	Lafourche Parish		Terrebonne Parish	
	2000	2005-2009	2000	2005-2009
Number of people employed	37,207	41,095	41,406	47,610
Unemployment rate	5.9%	3.9%	5.9%	5.3%
Per capita personal income	$15,809	$ 22,578	$16,051	$ 22,513
Median household income	$34,910	$ 46,196	$35,235	$ 47,338

* The 2005-2009 American Community Survey employment and income figures are based on data collected over the 2005-2009 period and represent an estimate of the average employment and income characteristics over the 5-year period.

Sources: U.S. Census Bureau, 2000 Decennial Census; 2005-2009 American Community Survey.

Public Facilities and Services

Public and quasi-public facilities and services in the project area include medical facilities, schools, police stations/sheriff's offices, and fire stations. According to 2010 ESRI data, there are two hospitals, two nursing homes, and three health care service facilities within the portion of Lafourche Parish included in the study area, and 15 medical care facilities (e.g., hospitals, medical centers, home health care services, and nursing homes) in Terrebonne Parish. Lafourche Parish has seven police stations/sheriff's offices and a juvenile justice facility located within the study area and Terrebonne Parish has four police stations/sheriff's offices, according to 2010 ESRI data. There are 23 fire stations located within the study area—five in Lafourche Parish and 18 in Terrebonne Parish. Public and quasi-public facilities and services in the project area also include an extensive network of pumps and levees for flood protection, and a series of navigation canals, including the GIWW, the HNC and Bayou Lafourche.

Transportation

Several major highways are located within the study area. For example, in Terrebonne Parish, Highways 315, 661, 57, 56, and 55 run in a north-south direction through the project boundaries while Highways 24, 90, 182, 309, 311, 316, 3040, 659, 660, and 58 run in an east-west direction. In Lafourche Parish, Highway 24 runs in an east-west direction through the project boundaries. In addition, numerous smaller highways and local streets are located throughout the project boundaries.

A series of navigation canals, including the HNC and the GIWW, are also located within the study area as well as the Port of Terrebonne. The HNC is Houma's twenty-six mile direct waterway route to the Gulf of Mexico from the Intracoastal Waterway. The GIWW is a navigable inland waterway which passes through the heart of Houma-Terrebonne in an east-west direction. The Port of Terrebonne, located in Houma roughly 26 miles north of the Gulf of Mexico at the convergence of the HNC and GIWW, is classified as a medium draft Port and has 400 acres of leasable, waterfront acres. The port is connected (via the HNC and GIWW) to ports and docks along the U.S. gulf coast and other markets.

The Houma-Terrebonne Airport and Industrial Park is also located within the study area. The airport provides easy access to the Gulf of Mexico and to the Central and South American markets.

Community and Regional Growth

Desirable community and regional growth with respect to the proposed hurricane protection project is considered growth that responds to the needs of the local communities and region, and is consistent with National Economic Development (NED) guidelines. The construction of the Mississippi River Bridge at Luling and the Interstate Highway 310 (I-310) has expanded the potential for community and regional development between the New Orleans MSA and the Houma MSA.

According to U.S. Census data, between 2000 and the 2005-2009 period, the following trends were observed in Lafourche Parish: population increased from 89,974 to 92,852, per capita personal income increased from $15,809 to $22,578, and employment increased from 37,207 to 41,095. During the same period, population in Terrebonne Parish increased from 104,503 to 108,277, per capita personal income increased from $16,051 to $22,513, and employment increased from 41,406 to 47,610.

Tax Revenues and Property Values

If hurricanes significantly impact businesses, industries, farms, and property values, and impact local employment and income, the tax base created by these activities could be impacted as well. Reduction in the flood risk from the surges associated with tropical events is the primary objective of projects similar to those proposed, and can have a commensurate positive impact on property values. Conversely, the lack of hurricane protection in areas most sensitive to storm damage could limit the growth of property values. In 2009, the Corps of Engineers identified a total of 52,041 residential and nonresidential structures within the project study area: 45,778 residential structures and 6,263 nonresidential/commercial structures.

According to the U.S. Census Bureau, the average median value of owner-occupied homes in Lafourche Parish between 2005-2009 was estimated to be $107,300 (compared with the state average of $121,300). The average median value of owner-occupied homes in Terrebonne Parish during this same period was estimated to be $112,800.

Community Cohesion

Community cohesion is the unifying force of a group due to one or more characteristics that provide commonality. These characteristics may include such commonality as race, education, income, ethnicity, religion, language, and mutual economic and social benefits. Community cohesion is the force that keeps group members together long enough to establish meaningful interactions, common institutions, and agreed upon ways of behavior. It is a dynamic process, changing as the physical and human environment changes. The changes brought about by water resource developments can impact community cohesion in different ways. For example, changing a right-of-way may divide a community; it may cause the dislocations of a significant number of residents; or it may require the relocation of an important local institution, such as a church or community center. On the other hand, a water resource development such as construction of a hurricane levee can represent an important public works project heavily supported by the local community.

The presence of social institutions such as libraries, places of worship, and schools provide residents an opportunity for civic participation and engagement which increases community cohesion. The study area is comprised of settled communities with stable complements of places of worship, schools, and community interaction. According to 2010 ESRI data, the portion of Lafourche Parish included in the study area has one library, seven places of worship, and 16 schools. The 2010 ESRI data also show that there are six libraries, 34 places of worship, and 45 schools located within the study area in Terrebonne Parish.

Environmental Justice

Environmental Justice (EJ) is institutionally significant because of Executive Order 12898 of 1994 (E.O. 12898) and the Department of Defense’s Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations. Minority populations are those persons who identify themselves as Black, Hispanic, Asian American, American Indian/Alaskan

Native, Pacific Islander, some other race or a combination of two or more races. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. Low-income populations as of 2011 are those whose income is $22,811 for a family of four using the Census Bureau's statistical poverty threshold. The Census Bureau defines a "poverty area" as a census tract or block numbering area with 20 percent or more of its residents below the poverty threshold level and an "extreme poverty area" as one with 40 percent or more below the poverty threshold level. This resource is technically significant because the social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the proposed actions. This resource is publicly significant because of public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions.

The methodology, consistent with E.O. 12898, to accomplish this EJ analysis includes identifying low-income and minority populations within the project area using up-to-date economic statistics, aerial photographs, U.S. Census Bureau and American Community Survey (ACS) estimates, as well as conducting community outreach activities such as public meetings. See Section 8 of this document for a list of public meetings conducted for this project. The newly released ACS estimates provide the latest socioeconomic community characteristic data, including poverty level, released by the U.S. Census Bureau and are based on data collected between January 2005 and December 2009. Race and ethnicity data at the census block level was compiled from the 2010 U.S. Census: PL 94-171 Redistricting File. The 2010 U.S. Census dataset was chosen because it is more complete and based on actual counts. Income and poverty data was compiled from the 2007-2011 American Community Survey (ACS) 5-Year Estimates.

A potential disproportionate impact may occur when the impact is appreciably more severe or greater in magnitude on minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income populations after taking offsetting benefits into account. For purposes of this analysis, all census tracts (income/poverty) and census blocks (race/ethnicity) located within the project area are identified as the EJ study area. Terrebonne and Lafourche Parishes are considered the reference communities of comparison.

The Morganza to the Gulf project area is located in south-central coastal Louisiana and encompasses portions of Lafourche and Terrebonne parishes. The initial EJ analysis specifically included consideration of environmental justice concerns to include an assessment of the potential for disproportionately high and adverse effects to minority and/or low-income populations at the census tract level. The census tract level data represents a more conservative evaluation of EJ communities and is useful in the analysis of EJ impacts in order to provide a consistent evaluation. Table 5-13 shows the percent minority and percent low-income for all census tracts within the project area. The goal of an EJ analysis is to make the greatest effort possible to identify EJ communities in a project area and to ensure the full and fair participation by all potentially affected communities in the planning process. For this reason, and in response to a recommendation from the U.S. Environmental Protection Agency (EPA) Region 6, additional analysis of the project area was conducted at the census block level for race and ethnicity, and at the census tract level for income and poverty level. Personal communication with Sharon Osowski, EPA Region 6, on March 1, 2013 confirmed this approach and level of analysis. Appendix J provides a summary report of the Environmental Justice analysis.

Construction-Related Impacts

Census Tracts 7 and 13 exceed the 50 percent minority threshold. In addition, both census tracts exceed the 20 percent low-income threshold. Census Tract 7 is located within the city limits of Houma near the Houma Terrebonne Airport. Census Tract 7 is not located near project boundaries and therefore is not likely to be affected by construction activities.

Census tract 13 is located south of Houma and extends southwardly to the Gulf of Mexico. The census tract includes the community of Dulac where construction activities are expected to occur. Construction impacts are temporary in nature and residents, irrespective of race, ethnicity, or income level, are expected to be similarly impacted by proposed construction activities.

Census Tracts 6, 11, and 12.02 exceed the 20 percent low-income threshold. Census Tract 6 is located within the city limits of Houma, north of census tract 7 and is located away from proposed construction activities.

Census Tract 11 includes the census-designated place of Montegut and the sparsely populated areas extending southwardly toward the Gulf of Mexico that includes Isle de Jean Charles. Construction activities are expected to occur within Census Tract 11. However, construction impacts are temporary in nature and residents, irrespective of race, ethnicity, or income level, are expected to be similarly impacted by construction activities.

Census Tract 12.02 is located to the west of Census Tract 11 and includes the census-designated place of Chauvin and the community of Cocodrie. Construction activities are expected to occur within Census Tract 12.02, however, impacts from construction activities are temporary in nature and residents, irrespective of race, ethnicity, or income level, are expected to be similarly impacted by construction activities.

Induced Flood Area Impacts

Use of census block level data provides a more detailed analysis of specific impacts to those communities outside the proposed levee alignment that would be subject to induced flooding during storm events. Twenty-four census blocks comprise the communities identified as having induced flooding from the proposed project and include parts of Gibson, Bayou Dularge, Dulac, and all of Cocodrie and Isle de Jean Charles. Fifty-four percent of the total population living in the induced flood area represented by 24 census blocks of the aforementioned five communities is minority (See Table 1, Induced Flooded Area Community Data in Appendix J).

Members of the state recognized Biloxi-Chitimacha-Choctaw tribe reside on Isle de Jean Charles, located to the south of the proposed levee alignment in Terrebonne Parish. For more information on the island and people of Isle de Jean Charles, see web site http://isledejeancharles.com/. According to 2010 census block data, there are 174 people living on Isle de Jean Charles of which 157 (90%) of the residents are minority. Isle de Jean Charles is located entirely outside of the proposed levee alignment and would likely experience induced flooding during storm events when the protection (levee) system is closed. While this raises a potential EJ issue, with respect to alternative protection alignments and induced flooding, neither of the alternatives to the No Action Alternative authorized for study under the PAC represents a separate alignment that would include this community. Providing hurricane risk reduction for Isle de Jean Charles has been determined in previous Corps of Engineers analyses to be cost prohibitive. Census Tract 11 has a total minority population of 26%, and Isle de Jean Charles represents 5% of the total population and 4% of the minority population of the census tract. The minority population inside of the proposed levee alignment is 29%, and the minority population of the entire project area is 28%. Additionally, 23% of Isle de Jean Charles households have incomes below the poverty level. Isle de Jean Charles is identified as an EJ community.

The southern portion of Dulac is located outside of the proposed levee alignment and would experience induced flooding during storm events when the entire protection (levee) system is closed. The area of Dulac that would be subject to induced flooding consists of three census blocks, with the majority of the population residing in one block. The area has a 54% minority population and 31% of the population is considered low income. Census Tract 13 has an overall minority population of 53% and 33% of the residents are considered low income. Dulac is identified as an EJ community.

The communities of Gibson and Bayou du Large consist of 5 block groups that could have induced flooding from the proposed alignment. None of those are predominately minority populations; however both have households that meet the U.S. Census definition of a poverty area and an extreme poverty area, respectively. Gibson and Bayou Du Large are identified as EJ communities.

The community of Cocodrie is located entirely outside of the proposed levee alignment and would be subject to induced flooding during storm events when the protection system (levee) is closed. Cocodrie has a minority population of 15% and 15% of the population is considered low income. Cocodrie was not identified as an EJ community.

Table 5-13. Minority and Low-income Characteristics

Census Tracts by Parish	Percent Minority	Percent Low-income
Lafourche		
Census Tract 216.02	14.0%	7.3%
Total Parish Average	19.9%	15.4%
Terrebonne		
Census Tract 1	27.5%	15.4%
Census Tract 3	22.0%	19.5%
Census Tract 5	25.7%	17.3%
Census Tract 6	37.3%	27.4%
Census Tract 7	59.7%	39.4%
Census Tract 8	26.7%	11.6%
Census Tract 9	41.4%	13.4%
Census Tract 11	22.7%	21.0%
Census Tract 12.01	8.0%	6.1%
Census Tract 12.02	7.8%	28.7%
Census Tract 13	53.4%	33.1%
Census Tract 14	38.4%	15.5%
Census Tract 17	17.3%	1.5%
Total Parish Average	28.6%	16.9%

Source: U.S. Census Bureau, 2005-2009 American Community Survey.

5.2.14 CULTURAL RESOURCES

Cultural Resources surveys have been conducted in lower Terrebonne Parish since 1926. The most recent and synthesized of these are Weinstein and Kelley (1992) and Brown *et al*. (2000). Very recently, new studies have begun with updated project alternatives and alignments, and a probability model and cultural resources investigation is underway at this time (Moreno *et al*. 2011). Numerous earthen mounds and shell middens have been located and recorded. Prehistoric settlement in lower Terrebonne Parish dates as early as the Marksville Period (A.D. 1 – 400) and includes mound sites, hamlets, and shell middens. Societies in the project area subsisted on marsh resources such as clams, fish, mammals, birds, and reptiles, while shellfish were also utilized as a food source and to provide a base on which to settle. By the Coles Creek Period (A.D. 700 - 1200), settlements in the region may have been organized as major mound sites surrounded by satellite villages and seasonal camps. Villages were concentrated on stable levee surfaces or at the confluence of distributaries. Both year-round occupation and seasonal movement have been suggested for the inhabitants of the area. During Plaquemine times (A.D. 1200 – 1700), the settlement pattern suggests a complex social hierarchy, with large ceremonial sites composed of multiple mounds surrounding a central plaza, and smaller villages and hamlets scattered throughout the area. Non-mound sites that have been located are on elevated natural levees and seem to have focused on the cultivation of crops. The majority of known prehistoric sites located in the vicinity of the project area date to this late prehistoric period, and suggest a significant occupation of the region.

The early historic period in southeast Louisiana is marked by increasing settlement and European dealings with Native American tribes. Early French writings describe a native cultural landscape of small tribal groups and shifting alliances. The most is known about the Chitimacha Indians, a federally recognized Native American tribe that claims ties to much of south Louisiana as its ancestral homeland, and is currently clustered around Charenton in St. Mary Parish. In addition to the many ancient Chitimacha village locations recorded in State Records, the Chitimacha Indians remember, respect, and maintain numerous traditional cultural properties within south Louisiana.

Although it is generally accepted that the Houma Indians were located near the confluence of the Red and Mississippi rivers during the early historic period, some historic accounts suggest that they were virtually wiped out by fighting and other causes of death during the years at the end of the 17th century and the beginning of the 18th century. By the middle of the 20th century, the Houma had grown and were settled in Terrebonne and Lafourche parishes. Descendents of these people are organized today as the United Houma Nation, but are not federally recognized as a Native American tribe.

After early European exploration of the area, the French began colonization efforts in the early 18th century. Settlement was sparse until the Acadians began arriving circa 1765, and their influence persisted throughout the Antebellum Era. The Civil War left the project vicinity relatively unaffected, but after the Civil War, all of south Louisiana had a hard task of recovery following the abolition of slave labor and war-related destruction of levees and other aspects of infrastructure. New plantations and new economies began to develop. By the late 19th century, small communities were emerging along the bayous. Population fluctuations took place as blacks, the predominant population before the Civil War, migrated outward to seek more opportunities.

The growth of the sugar industry was a boom to the area, and in 1917 the first commercial gas well struck near Montegut. Numerous oil and gas fields dot the region today. The shrimping industry grew as innovations occurred that allowed greater catches to be more easily retrieved and distributed. Canal systems and the GIWW have made a large portion of the project vicinity navigable by water, which has aided in the distribution of all resources. Today, the project vicinity is a vital economic area with diverse productive strategies and diverse peoples.

The most recent studies have identified a few known cultural resources that overlap portions of the currently proposed alignment and would receive further investigations to avoid or mitigate impacts to cultural resources. Within Reach A, 16TR193 is a prehistoric scatter that could not be relocated as of 1986. Within Reach E, site 16TR71 is a prehistoric scatter overlain by historic material. Site 16TR261 overlaps a portion of Reach H, and most likely has been destroyed. Site 16LF108 is the remnant of a prehistoric scatter located within Reach K that was reported as probably destroyed by modern land use. Other portions of the currently proposed alignment have been assessed by factors of soil and past landform, as high or low probability to contain cultural resources.

5.2.15 RECREATION

The recreational resources study area includes southern portions of Lafourche and Terrebonne parishes (south of Houma). It is included in Region 3 of the Louisiana State Comprehensive Outdoor Recreation Plan (SCORP). Major bodies of water located in the study area include Lake Boudreaux, Lake Felicity, Bayou Terrebonne, Bayou Pointe aux Chenes, Bayou du Large, and many others including numerous oil field canals. The Pointe aux Chenes Wildlife Management Area (WMA) and Mandalay National Wildlife Refuge (NWR) are located within the study area. The Lower Atchafalaya Basin and the Wisner Wildlife Management areas are also located in the vicinity. Most of the study area is comprised of brackish and saline marshes with some forested wetlands and uplands. Recreational facilities include camps, marinas, boat launch ramps, and small neighborhood parks.

The study area is comprised of a series of narrow ridges along bayous that extend toward the Gulf of Mexico through coastal swamps and marshes. The more significant ridges along navigable bayous have historically supported the development of small communities and provide key points of access to the vast coastal wetland resources of the study area. These extensive wetland resources, comprised of swamp and marsh habitat, have traditionally supported substantial consumptive and non-consumptive recreational uses. Primary consumptive recreational uses have included both freshwater- and saltwater-based activities. Freshwater-based consumptive uses include freshwater fishing, crawfishing, hunting for waterfowl, as well as hunting for deer or small game along natural ridges and in wooded swamp lands. Primary saltwater-based activities have included saltwater fishing, recreational shrimping, and crabbing. Non-consumptive activities have included recreational boating, water skiing, birdwatching, hiking, and camping.

Like much of coastal southeast Louisiana, much of the study area has experienced substantial coastal erosion, loss of wetlands, and increasing salinity levels. These conditions are due to numerous factors, such as extensive oil and gas exploration via a maze of canals and pipelines, subsidence, and coastal storm surges. Although the study area has traditionally provided excellent saltwater fishing, in recent years, because of the increased salinity levels, anglers have been able to catch saltwater species much farther inland than in the past. As fresh and intermediate marshes, cypress trees, and SAV in the area have disappeared, waterfowl habitat has become less abundant, and, consequently, duck hunting opportunities have decreased.

Unlike most of coastal Louisiana, the far western portion of the study area, due to the influence of the Atchafalaya River, has been relatively stable or experiencing some limited accretion of deltaic lands. Salinity levels are relatively stable in this area, and freshwater fishing opportunities in the area are excellent. The floating marshes traditionally have provided quality habitat for waterfowl and waterfowl hunting.

The study area includes the 4,212-acre Mandalay NWR and the 35,000-acre Pointe aux Chenes WMA (Figure 3-1). The Mandalay NWR is located approximately six miles southwest of Houma, Louisiana, which is approximately 55 miles southwest of New Orleans. The refuge was established in 1996 in Terrebonne Parish, Louisiana, is accessible only by boat and has a beautiful freshwater marsh with ponds, levees and man-made canals. The Mandalay NWR alone is visited annually more than two-thousand times. The most prominent recreational activities within the study area are consumptive uses: fishing and waterfowl hunting. Limited consumptive recreation uses include recreational crabbing, shrimping, and crawfishing. Natural ridges are also utilized for deer and small game hunting. Non-consumptive recreational activities attract far fewer participants and include birdwatching, hiking, wildlife observation, boating and photography.

Pointe aux Chenes WMA, situated in the center of the study area, is located in Terrebonne and Lafourche parishes approximately 15 miles southeast of Houma (Figure 3-1). The WMA, which is owned by LDWF, includes about 35,000 acres.

The topography of the area is mostly marsh, varying from nearly fresh to brackish interspersed with numerous ponds, bayous, and canals. Game species hunted are waterfowl, deer, rabbit, squirrels, rail, gallinule, and snipe. Inland saltwater fish species, crabs, and shrimp are available in the more brackish water. Fishing success is excellent due to the proximity of the Timbalier and Terrebonne Bay watersheds. Freshwater fisheries may be caught in the more northern portions of the management area. Recreational fishing in the study area occurs almost entirely in boats. The physical characteristics of the shoreline in the study area, especially the presence of wetlands, limit access to shore fishing. Non-consumptive forms of recreation are boating, nature study, camping (a tent-camp ground is available along Highway 665, north of the Headquarters area), and picnicking.

Access to the interior is typically limited to boat travel due to the lack of roads. Boat launches into the interior of the area are available on Island Road and on Highway 665, south of the Headquarters area. The terrain is mostly marsh; the only timber stands are located on the Point Farm Unit of the area or areas adjacent to natural bayous and older oil and gas canals. Management practices employed to increase productivity of the marshes for furbearers, waterfowl, alligators, and fish are mainly directed towards water control through the use of variable crested weirs and levees.

Recreational resources are publicly significant because of the high value that the public places on fishing, boating, and hunting as measured by the large number of fishing and hunting licenses and the large number of recreational boat registrations obtained in area parishes. This is particularly important, as many of the predominant recreational activities in the study area are only accessible by boat.

Forty-two boat launches are located in the study area and provide access to recreational opportunities. The Pointe aux Chenes marina, an unnamed launch near the WMA offices, and a boat launch on Iles de Jean Charles Road are located within LDWF's Pointe aux Chenes WMA.

Factors contributing to the high proportion of boating activity for fishing include the high quality of the recreational fishery, especially an abundance of red fish and trout. Pleasure boating occurs to a lesser degree than boat fishing. One indicator of the amount of recreational fishing that occurs in the study area is the number of recreational boats registered in the two parishes. In 2010 within the parishes of Lafourche and Terrebonne, there were about 26,000 registered boats, 50,000 resident fishing licenses, and nearly 18,000 resident hunting licenses issued by the State of Louisiana.

Tables 5-14 through 5-16 below show the number of fishing licenses, hunting licenses, and boat registrations, respectively, within the study area. The fishing and hunting license and boat registration data are provided by the Louisiana Department of Wildlife and Fisheries (http://www.wlf.louisiana.gov/education/economics/).

Table 5-14. Fishing Licenses Sold in the Vicinity of Project Area - Fiscal Year 2010

Parish	Resident-Freshwater	Resident - Saltwater	Non-Resident Freshwater	Non-Resident Saltwater
Terrebonne	27,025	26,872	3,698	5,709
Lafourche	23,066	22,424	3,270	5,653

Table 5-15. Boat Registrations in the Vicinity of the Project Area - Fiscal Year 2009

Parish	Boat Registrations
Terrebonne	14,672
Lafourche	11,733

Table 5-16. Hunting Licenses Sold in the Vicinity of the Project Area - Fiscal Year 2010

Parish	Resident	Non-Resident	Resident Duck Only	Non-Resident Duck Only
Terrebonne	9,095	537	2,585	58
Lafourche	8,638	118	2,006	26

5.2.16 AESTHETICS

Ecoregions

Ecoregion information has been identified for the study area. The information was adapted from Daigle *et al*. 2006. The study area's natural landscape visual characteristics are derived from its Mississippi Alluvial Plain setting; this ecoregion extends from southern Illinois, at the confluence of the Ohio River with the Mississippi River, south to the Gulf of Mexico (Figure 5-8). The Mississippi River watershed drains all or parts of thirty-one states, two Canadian provinces, and approximately 1,243,000 square miles before the river finally reaches the Gulf. The Mississippi Alluvial Plain is mostly a broad, flat alluvial plain with river terraces, swales, and levees providing the main elements of relief. Winters are mild and summers are hot, with temperatures and precipitation increasing from north to south. Bottomland deciduous forest covered the region before much of it was cleared for cultivation. The ecoregion contained one of the largest continuous wetland systems in North America. The widespread loss of forest and wetland habitat, however, has impacted wildlife and reduced bird populations, although it is still a major bird migration corridor. Today, constructed levees restrict the river from overflowing, opening large areas for extensive agricultural use. Almost the entire region is in cropland. In Louisiana, cotton, corn, soybeans, pasture, and rice are major crops in the northern and central parts and sugar cane, soybeans, and pasture are dominant in the southern part. Between the levees that parallel the Mississippi River is a corridor known as the "batture lands." The batture lands are hydrologically connected to the Mississippi River, are flood-prone, and contain remnant habitat for "big river" species (e.g., pallid sturgeon) as well as river-front plant communities. The sub-ecoregions Southern Holocene Meander Belts, Inland Swamps and the Deltaic Coastal Marshes and Barrier Islands further define the study area's landscape visual characteristics.

The Southern Holocene Meander Belts ecoregion stretches from just north of Natchez, Mississippi south to New Orleans, Louisiana. The ecoregion is a flat to nearly flat floodplain containing the meander belts of the present and past courses of the Mississippi River. This ecoregion has a long growing season, warmer annual temperatures and more precipitation than its northern Mississippi Alluvial Plain counterparts. The ecoregion contains minor species such as live oak, laurel oak, and Spanish moss that are generally not found in the more northerly regions. The bottomland forests have been cleared and the region has been extensively modified for agriculture, flood control, and navigation. The levee system is extensive throughout the region. Soybeans, sugar cane, cotton, corn, and pasture are the major crops, with crawfish aquaculture common.

Figure 5-8 Foldout Blank

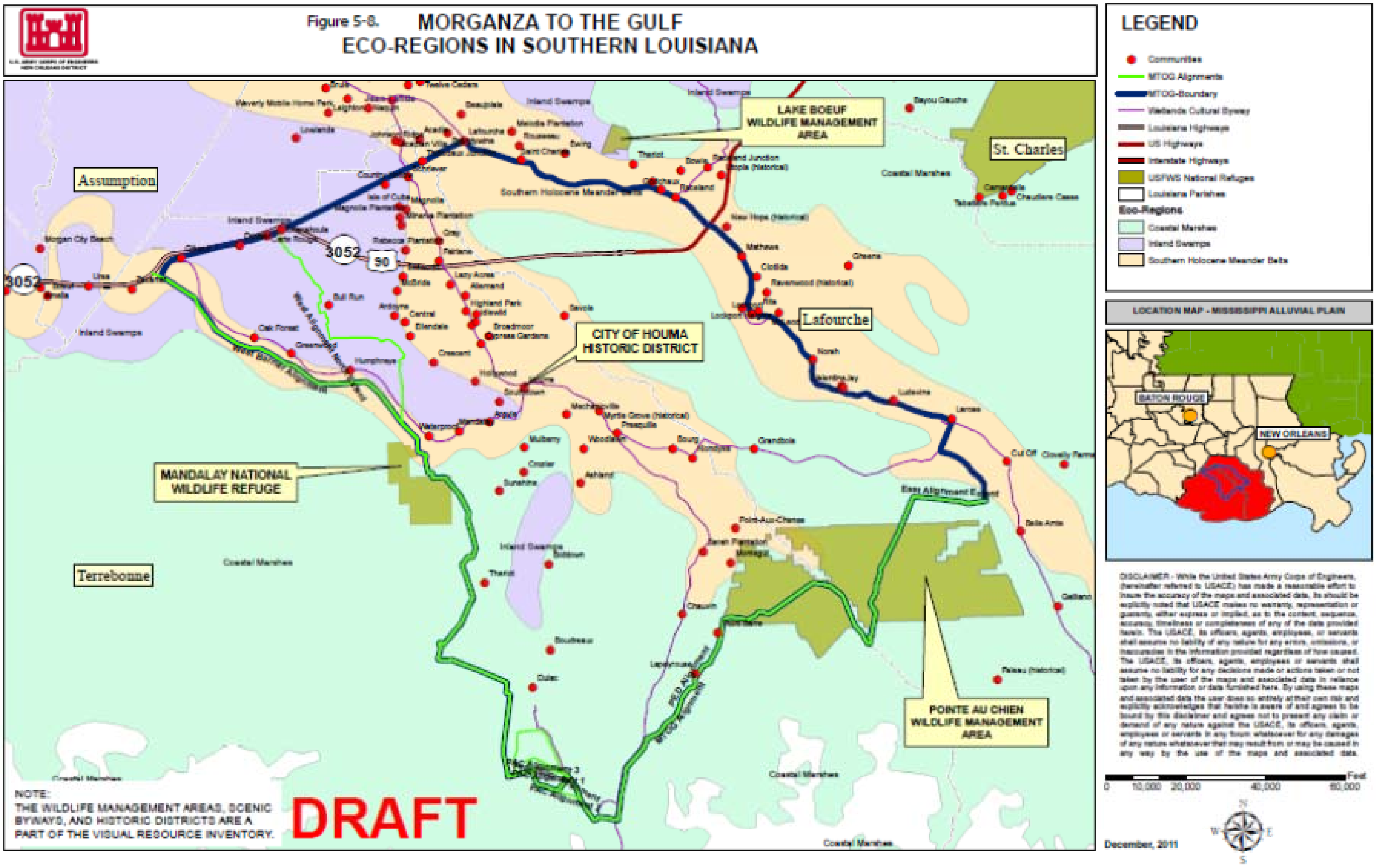

Figure 5-8. MORGANZA TO THE GULF ECO-REGIONS IN SOUTHERN LOUISIANA

NOTE:
THE WILDLIFE MANAGEMENT AREAS, SCENIC BYWAYS, AND HISTORIC DISTRICTS ARE A PART OF THE VISUAL RESOURCE INVENTORY.

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facilities including restaurants and food stores and community facilities such as neighborhood parks, schools, and athletic fields. Visual access to the area is wider along roads and waterways and the less densely developed areas.

Industrial: This zone primarily is within the Southern Holocene Meander Belts ecoregion. Although residences and commercial facilities can be located within this zone, maritime industrial uses, including resources for petroleum and natural gas exploration, predominate. There is little canopy cover, but views are typically diverted to the industrial development that lines LA 182 and Bayou Cocodrie. Terrain is typically flat. Regional access to the area is from U.S. Route 90.

Agricultural: This zone is within the Southern Holocene Meander Belts ecoregion. This area is marked primarily by flat, mostly open land associated with various bayous sometimes with vegetation along the edges or between fields helping to define the space. Isolated small citrus orchards are found within these areas. Associated low-density, rural development along road frontages and at the various crossroads is included in this zone. The zone includes small retail facilities including restaurants and food stores and community facilities such as neighborhood parks, schools, and athletic fields. Panoramic views are possible but may be limited by the interspersed pockets of forest vegetation. The Wetlands Cultural Scenic Byway provides viewsheds along LA 182 from Houma to Gibson and along LA 56 south of Houma.

Nonforested Wetlands: This zone is within the Deltaic Coastal Marshes and Barrier Islands ecoregion. The terrain is mostly marsh interspersed with numerous lakes, ponds, bayous, and canals. Man made features include petroleum and natural gas wells, and the Gulf-Intracoastal Waterway. Public recreation access areas include Mandalay NWR and Pointe aux Chenes WMA. Physical access to most of the area is limited to boat travel that allows for panoramic viewsheds of the area. The Wetlands Cultural Scenic Byway provides viewsheds along its southern spurs from Houma to Cocodrie along LA 56 and then to Dulac on LA 57.

Forested Wetlands: This zone is within the Inland Swamps ecoregion. The terrain is mostly bottomland hardwood and Bald Cypress communities. Water resources include Lake Palourde in the area north of Morgan City and numerous canals in the area south of Houma. Man made features include petroleum and natural gas wells and the HNC. Lake End Park provides visual access to Lake Palourde. LA 315 and LA 57 provide viewsheds to the area south of Houma as one travels to Theriot and Dulac. Physical access to most of the area is limited to boat travel. Viewsheds may be limited by the interspersed pockets of forest vegetation.

Visual Resource Inventory

The following visual resources scenic character has been recognized by national or state designations. There may be additional visual resources not identified including public parks and recreation areas. Specific project details used for the resource’s environmental impact analysis may identify other visual resources.

Houma Historic District: The Houma Historic District consists of the city's central business district and two related residential areas including 118 buildings. The Houma Historic District

Terrebonne Parish Courthouse Square, surrounded by mature live oak trees, is the historic district center. Most of the commercial buildings are located along Main Street, which parallels Bayou Terrebonne. In its central portions, Main Street has a two story scale consisting mainly of typical early-twentieth century commercial buildings with commercial space downstairs and residential space above. Historic residences of the district are primarily shotgun houses, bungalows, or cottages (see Figure 5-9).

Mandalay NWR: Mandalay NWR is located approximately 6 miles southwest of Houma, Louisiana. Access to the interior is limited to boat travel. The 4,416 acre refuge is a stopping point for migratory birds. Recreation use includes wildlife observation and photography. The refuge also provides opportunities for environmental education and interpretation.

Pointe aux Chenes WMA: Pointe aux Chenes WMA is approximately 15 miles southeast of Houma. This area includes about 35,000 acres. Access to the interior is limited to boat travel. The only timber stands are located on the Point Farm Unit of the area, or areas adjacent to natural bayous and older oil and gas canals. Recreation use includes nature study, camping, and picnicking.

Wetlands Cultural Scenic Byway: The Wetlands Cultural Scenic Byway is 204.1 miles in length and has two interconnected loops and three spurs; the spurs are primarily contained within the study area. The eastern spur extends along LA 182 between Houma and Gibson allowing access to Houma’s Downtown National Historical District and Mandalay National Wildlife Refuge. Two southern spurs descend from Houma to Cocodrie along LA 56 with a side route on LA 57 to Dulac. These route segments are shown in Figure 5-9.

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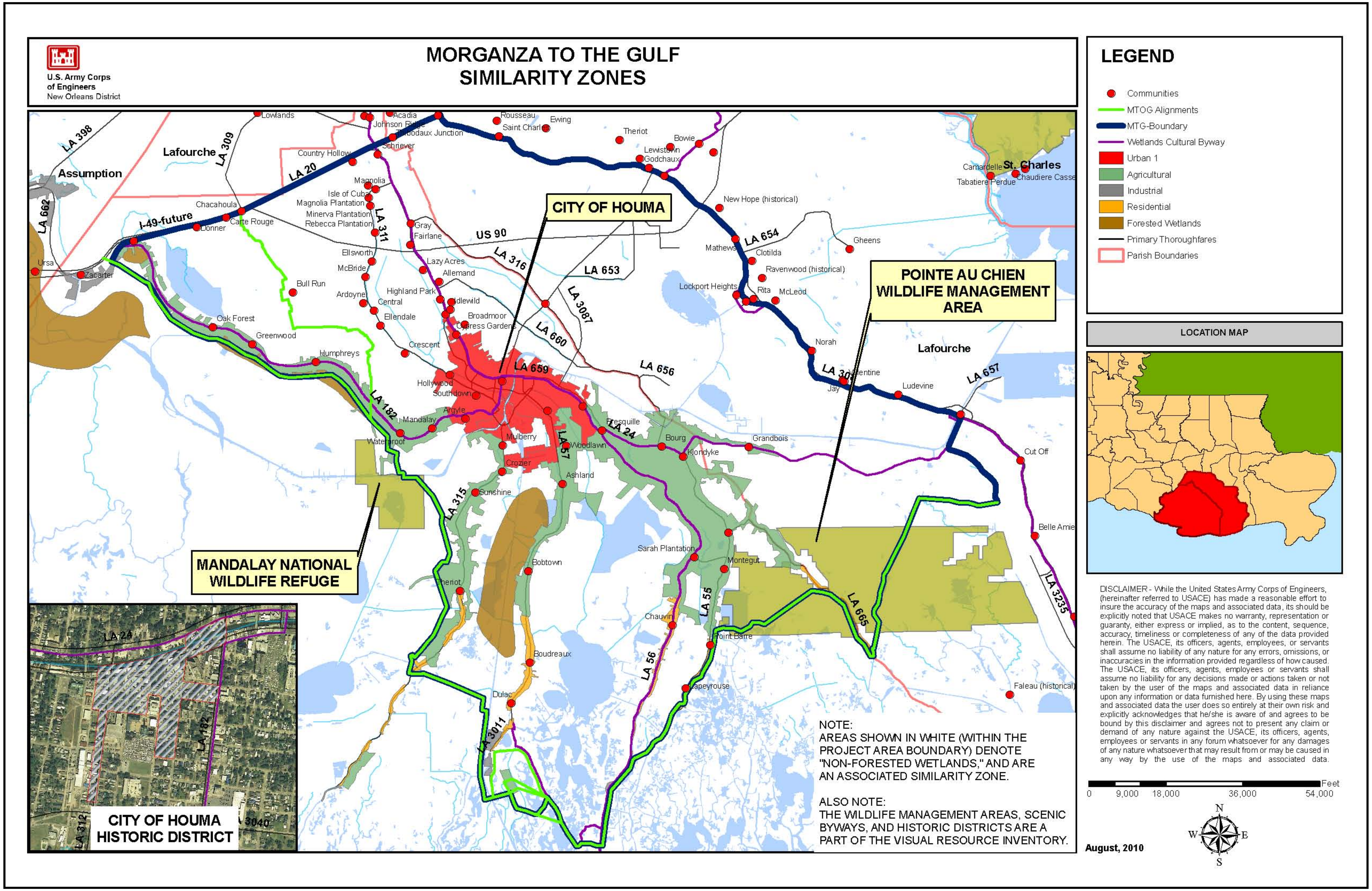

NOTE:
AREAS SHOWN IN WHITE (WITHIN THE PROJECT AREA BOUNDARY) DENOTE "NON-FORESTED WETLANDS," AND ARE AN ASSOCIATED SIMILARITY ZONE.

ALSO NOTE:
THE WILDLIFE MANAGEMENT AREAS, SCENIC BYWAYS, AND HISTORIC DISTRICTS ARE A PART OF THE VISUAL RESOURCE INVENTORY.

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Figure 5-9. Landscape Similarity Zones in the Project Area (This is a Foldout 11x17)

6. ENVIRONMENTAL CONSEQUENCES

6.1 Introduction

This section describes the direct, indirect, and cumulative effects of each alternative on the significant resources in the project area. Impacts are compared to the No Action Alternative, also known as the "future-without project condition".

Direct impacts are those effects that are caused by the proposed action and occur at the same time and place (Section 1508.8(a) of 40 CFR Parts 1500-1508). For example, the placement of earthen materials to create acres of marsh habitat would be a direct impact. Indirect impacts are those effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable (Section 1508.8(b) of 40 CFR Parts 1500-1508). For example, shoreline protection features reduce the long-term rate of erosion to interior wetlands.

Cumulative impacts are the effects on the environment that result from the incremental impact of the proposed project 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 impacts can result from actions that individually are minor, but collectively result in significant actions taking place over time (Section 1508.7 40 CFR Parts 1500-1508). For example, the incremental impacts of emergent wetland creation at several localized areas could significantly modify an entire basin's habitat diversity.

Although this RPEIS is programmatic in nature, the following features of the action alternatives have sufficiently detailed designs to be fully assessed in this RPEIS, and would not require additional NEPA documentation. These features, termed "Constructible Features", include levee reaches F1, F2, G1; the HNC Lock Complex; and the Bayou Grand Caillou Floodgate (Figure 4-10). The remaining components of the project are termed "Programmatic Features." Section 4 provides more details about these project features. Where the project affects constructible features differently from programmatic features, descriptions of effects on constructible features are broken out separately. Otherwise, if no differences are evident, the effects of both programmatic and constructible features are combined. Programmatic features would require additional NEPA investigations before construction occur.

The period of impact analysis would begin in 2015, when the construction impacts would begin, and would be evaluated over a 70-year period from 2015 through the period of evaluation in 2085.

The USACE has determined that the 1% AEP Alternative is consistent, to the maximum extent practicable, with the State of Louisiana's Coastal Resources Program.

There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future compared to without project conditions due to RSLR. There is a potential for beneficial impacts to communities in the area by reducing the amount of non storm related tidal flooding. The potential impacts, that would be attributable to the proposed operation of the Federal levees system (including the structures), are unknown at this time but under some SLR, and levee system operation scenarios, these impacts could be significant. The level of impact would be dependent on the resource examined and how the operating plan is changed, the amount of background wetland loss due to RSLR, modifications in the systems affecting navigation access, and/or any changes resulting from the project being constructed and operated by the State of Louisiana and Terrebonne Levee and Conservation District along the alignment of the proposed Federal project. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis. This discussion is intended to supplement the indirect and cumulative impacts sections for each resource discussed in the following sections.

A summary of environmental consequences is displayed in Table 4-4. A description of each alternative and the plan formulation process is provided in Section 4.0 *Alternatives*.

Several LCA projects authorized by WRDA 2007 are located within the Morganza study area, including but not limited to: (1) Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock (2) Modification of Davis Pond Diversion and (3) Land Bridge between Caillou Lake and Gulf of Mexico. By letters dated August 20, 2012 and October 16, 2012, CPRAB has notified the Corps that it desires to suspend study and design on these projects not due to this project. The decision of CPRAB to suspend these projects results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA but may be designed and constructed using other authority and funding.

Several CWPPRA projects have been built or may be built in the area. The CWPPRA program plans projects to have a 20 year project life. The present authorization would end in 2019 and there is uncertainty with respect to if the program would be reauthorized and funded. For more information on the program go to http://lacoast.gov.

6.2 Coastal Vegetation and Wetlands

6.2.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

An overview of future-without-project vegetated wetlands in the study area is summarized below. Much of the information is derived from the 2000 FWCA Report.

Under the No Action scenario, fresh marshes near the Atchafalaya River and Bayou Penchant would likely expand in the future from increasing amounts of fresh water, nutrients, and sediments as the Atchafalaya River Delta matures (Figure 3-1). In the northeastern portion of the study area, seasonal freshwater inflow via the GIWW is expected to increase. Tidal action in this portion of the study area may increase gradually as the buffering effect of marshes to the south is lost. Consequently, use of this area by estuarine-dependent fishes and shellfish tolerant of freshwater conditions would likely increase.

Throughout most of the rest of the study area, substantial losses of vegetated wetlands are expected. Salinity regimes would likely move northward, converting fresh and intermediate marshes into brackish marshes. High subsidence rates and erosion associated with predominant southeasterly winds and periodic tropical storms may convert most of the marshes between Bayou Terrebonne and Bayou Pointe au Chien to open water within 20 to 40 years.

Wetland loss has been most severe in the central portion of the Penchant Subbasin near Jug Lake (Figure 3-1). Under the No Action scenario, losses in this area are expected to continue due to subsidence and insufficient sediment accretion. Brackish and saline marshes are expected to become dominated by large lakes and bays with little, if any, submerged aquatic vegetation (SAV).

The overall habitat value and acreage of remaining wetlands would decline with the No Action Alternative. WVA analyses predicted that much of the vegetated wetland acreage in the study area would be lost of over the period of analysis. Several of the sub areas could lose all emergent wetlands before the end of the period of analysis.

Vegetated wetlands in the study area may be improved under the No Action Alternative through LCA, CWPPRA, and other Federal, state, and local restoration programs. For example, the LCA project, *Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock* would redistribute existing freshwater to prevent, reduce, and/or reverse future wetland loss and sustain productive fish and wildlife habitat in Terrebonne Parish (USACE 2010).

6.2.2 1% AEP ALTERNATIVE

To determine the impacts of the project, an interagency Habitat Evaluation Team (HET) was formed to use Wetland Value Assessment (WVA) methodology to assess the quality of wetlands of the area and make a determination of the effects of various aspects of the project on future conditions. A description of the WVA methodology, analysis, and assumptions made by the HET may be found in Appendix F, *Wetland Value Assessment.* Mitigation requirements to compensate for wetland impacts determined through WVA methodology are provided in Section 6.19.

Direct Impacts

Table 6-1 provides wetland acreages lost from the direct impacts of the 1% AEP Alternative on wetland types based on low, intermediate, and high RSLR scenarios. Affected wetland types include bottomland hardwood forest; swamp; fresh, intermediate, brackish, and salt marshes; and shallow open water. See the Clean Water Act Section 404(b)(1) evaluation in Appendix C.

Table 6-1. Direct Effects (Acres) of the 1% AEP Alternative on Wetlands

Feature	Low RSLR Scenario			Intermediate RSLR Scenario			High RSLR Scenario		
	Tidal Wetland	Force Drain Wetland	Total Wetland	Tidal Wetland	Force Drain Wetland	Total Wetland	Tidal Wetland	Force Drain Wetland	Total Wetland
Constructible Features	645	26	671	644	26	670	643	26	669
Programmatic Features (Total alignment – Constructible features)	3,413	31	3,444	3,412	31	3,443	3,405	31	3,436
Total Impact	4,058	57	4,115	4,056	57	4,113	4,048	57	4,105

Source: Appendix F, *Wetland Value Assessment*.

Programmatic Features: As shown in Table 6-1, the construction of levees and other structures associated with the programmatic aspects of the 1% AEP would result in the loss of approximately 3,443 acres of wetlands through their conversion to uplands and open water under the intermediate SLR scenario. Approximately 520 acres of BLH, 599 acres of swamp, 802 acres of FM 57 acres of FM non tidal, 615 acres IM, 783 BM, and 735 acres SM could be impacted directly by this project. It should be noted that the amount of impacts from programmatic features could decrease as the plans are refined. The levee and borrow footprints might be expected to decline rather than increase during detailed planning. The HET used an estimate of levee and borrow pit widths to determine direct impacts. It is likely that many of the marsh borrow pit areas would not be usable; thus, material would have to be hauled from upland sites. Finally, some of the borrow pit material from the top layer would not be suitable for levee construction and could be used for marsh restoration. Quantification of these impact decreases was not possible, so the worst-case scenario is presented here. Future NEPA documents would assess the environmental effects of detailed plans and refinements.

Because of the susceptibility of disturbed areas to the establishment of invasive plants (Fox & Fox 1986, Rejmanek & Richardson 1996, Wiley 2007), levee construction and other habitat modifications may be conducive to the introduction of such invasive plant species as the Chinese tallow tree, giant salvinia, and water hyacinth. It is anticipated that an aggressive maintenance program by the local sponsor would control the introduction of such invasives to levees and other project features.

Constructible Features: The constructible components of the 1% AEP Alternative would result in the loss of brackish (414.12 acres), intermediate marshes (230.11 acres), and non tidal fresh marsh (26.39 acres) with their conversion to uplands and open water. Table 6-1 summarizes the acres affected by the project's constructible features.

Indirect Impacts

After viewing the hydraulic and hydrodynamic models CEMVN determined that minor indirect impacts to wetlands could take place due to change in fishery access based on the historic sea level rise in the near term. Even though these indirect impacts are minor they would effect a significant number of acres of wetlands (approximately 3,965 acres of fresh marsh habitats, 16,020 acres of intermediate marsh habitats, 12,442 acres of brackish marsh habitats, and 13,788 acres of saline marsh habitats)**.** A system wide hydrodynamic model and structure-specific models verified that water control features would have no significant negative impact on salinities that would indirectly impact project-area wetlands. Mitigation requirements are presented in Section 6.19. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Cumulative Impacts

When combined with LCA, CWPPRA, and other Federal, state, and local restoration efforts, the net effects could be beneficial to wetland resources of the study area.

6.2.3 3% AEP ALTERNATIVE

Direct Impacts

Programmatic Features: The types of impacts associated with the programmatic features of the 3% AEP Alternative would be similar to those of the 1% AEP Alternative. However, because the footprint of the levee system would be smaller, the amount of wetlands converted to uplands would be somewhat lower. Table 6-2 presents the direct wetland impacts resulting from the 3% AEP Alternative. Approximately 430 acres of BLH, 561 acres of swamp, 651 acres of FM, 31 acres of FM non tidal, 416 acres IM, 587 BM, and 536 acres SM could be impacted directly by this project. Although mitigation estimates are provided in Section 6.19, further WVA analysis would be performed when refined plans and specifications are completed and additional NEPA documentation is accomplished.

Constructible Features: The constructible components of the 1% AEP Alternative would result in the loss of brackish (327.25 acres), intermediate marshes (194.23 acres), and non tidal marsh (26.39 acres) with their conversion to uplands and open water. Table 6-2 presents the acres and AAHUs of direct wetland impacts resulting from the 3% AEP Alternative. Mitigation requirements are presented in Section 6.19.

Table 6-2. Direct Effects (Acres) of the 3% AEP Alternative on Wetlands.

Feature	Low SLR Scenario			Intermediate SLR Scenario			High SLR Scenario		
	Tidal Wetland	Force Drain Wetland	Total Wetland	Tidal Wetland	Force Drain Wetland	Total Wetland	Tidal Wetland	Force Drain Wetland	Total Wetland
Constructible Features	522	14	536	521	14	535	520	14	534
Programmatic Features	2,662	17	2,679	2,661	17	2,678	2,653	17	2,670
Total Impact	3,184	31	3,215	3,182	31	3,213	3,173	31	3,240

Source : Appendix F, *Wetland Value Assessment*.

Indirect Impacts

Indirect effects associated with the implementation of the 3% AEP Alternative would be similar to those of the 1% AEP Alternative.

Cumulative Impacts

Cumulative effects associated with the implementation of the 3% AEP Alternative would be similar to those of the 1% AEP Alternative.

6.3 Prime and Unique Farmland

Preliminary coordination with NRCS was undertaken to assist in identifying the effects of the proposed project on prime and unique farmlands. Continuing coordination would be accomplished, and the results of that coordination included in the Final PEIS.

6.3.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Under the No Action Alternative, hurricane and tropical storm tidal surges would continue to cause damage to prime farmland located throughout Terrebonne and Lafourche parishes. Additionally, due to continuing land loss in the project area, levees protecting prime farmland would become increasingly vulnerable to storm damage.

6.3.2 1% AEP ALTERNATIVE

Construction of the levee, structures, and other features in the proposed right of way for reaches from the Barrier Alignment through Reach L would potentially impact approximately 359 acres of prime farmland (Figure 6-1). Construction of the mitigation areas for these reaches would potentially impact approximately 53 acres of prime farmland. Preliminary drawings of the Lockport to Larose Ridge and Larose Section C-North Variant footprints show that approximately 262 and 51 acres of agricultural land would be impacted, respectively. According to a review of NRCS data, some of the impacted farmland is classified as prime farmland and would be impacted (Figure 6-1). In compliance with the Farmland Policy Protection Act, coordination with the NRCS is on-going.

Remaining prime and unique farmlands would be protected from most storms. Indirect effects could include storm protection thereby promoting additional development that could take place on prime and unique farmlands. This alternative, combined with local levee projects that might convert prime farmlands, would cause adverse cumulative impacts to prime farmlands in the project area.

6.3.3 3% AEP ALTERNATIVE

Construction of the levee, structures, and other features in the proposed right of way would potentially impact approximately 234 acres of prime farmland. Construction of the mitigation areas would potentially impact approximately 32 acres of prime farmland (Figure 6-2). Fewer

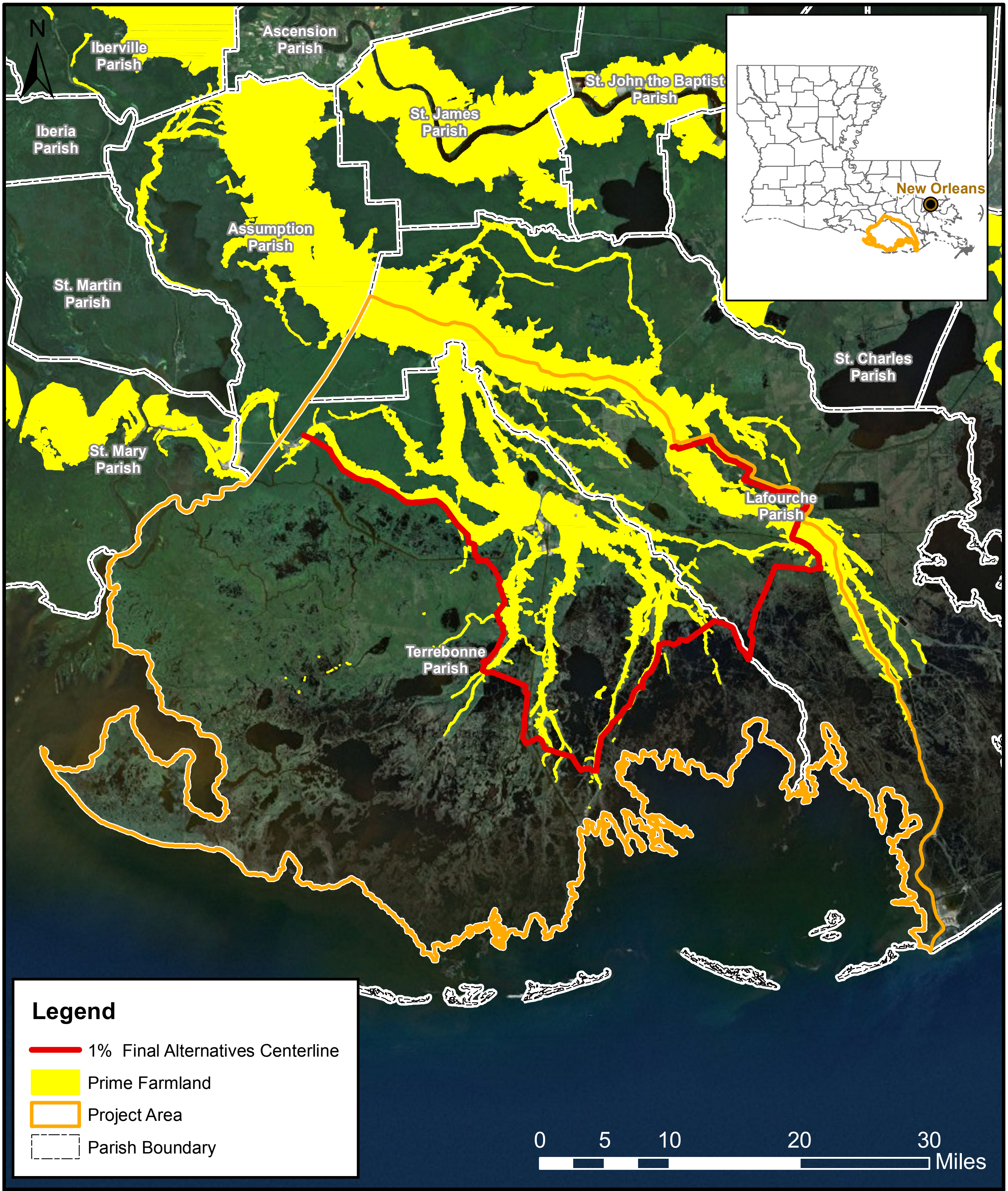


Figure 6-1. 1% AEP Alignment and Prime Farmland

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

ESRI World 2D Imagery

GEC
Gulf Engineers & Consultants

Figure: 6-1
Date: June 2012
Scale:1:650,000
Source: ESRI/GEC
Map ID: 273160010-2948

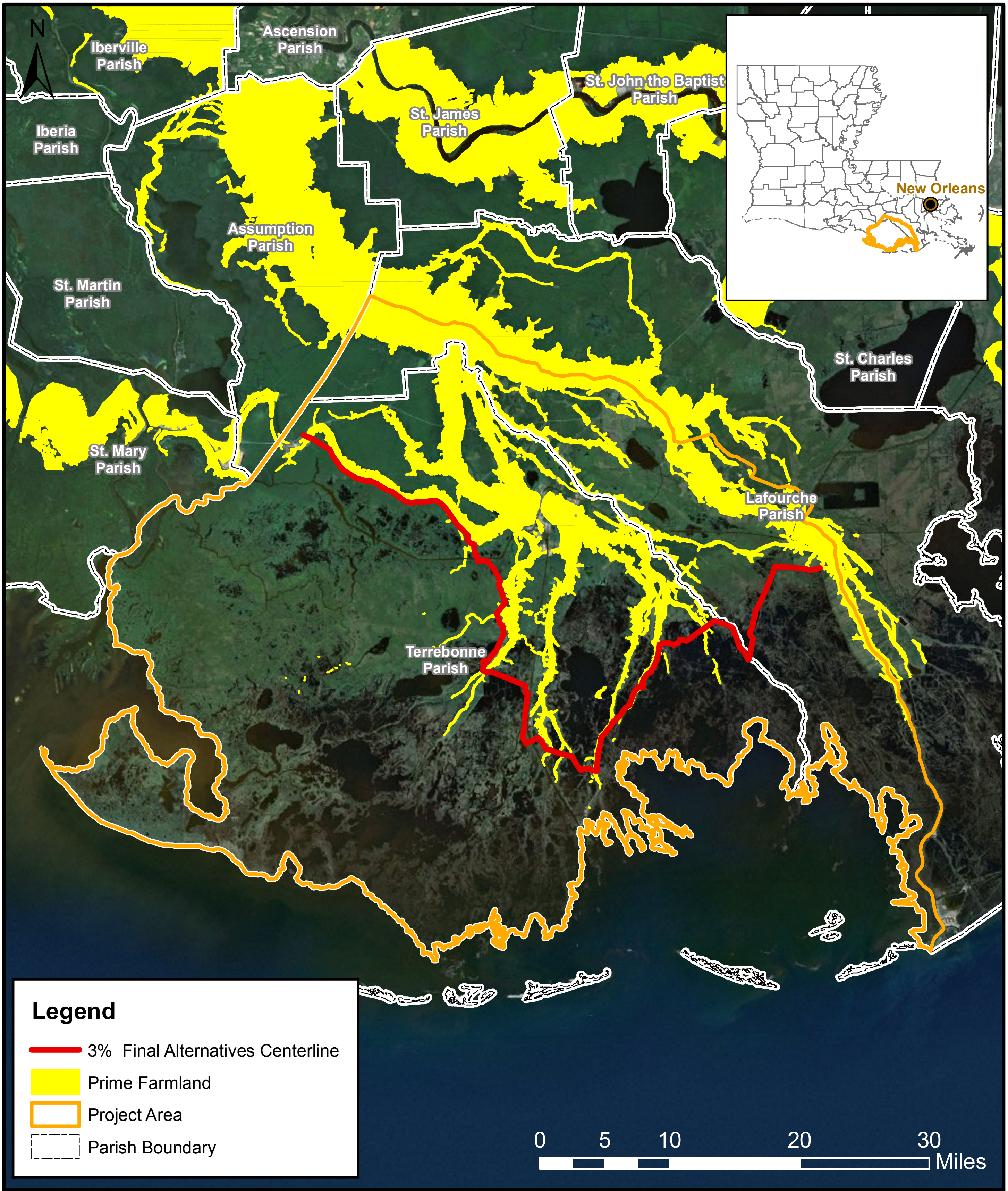


Figure 6-2. 3% AEP Alignment and Prime Farmland

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

ESRI World 2D Imagery

Gulf Engineers & Consultants

Figure: 6-2
Date: June 2012
Scale:1:650,000
Source: ESRI/GEC
Map ID: 273160010-2948

remaining prime and unique farmlands would be protected from storms than the 1% AEP Alternative. Indirect and cumulative effects associated with the implementation of the 3% AEP Alternative would be similar to those of the 1% AEP Alternative.

Indirect and cumulative effects of this alternative are similar to those of the 1% AEP Alternative.

6.4 Aquatic Resources

6.4.1 BENTHIC RESOURCES

No Action Alternative (Future Without Project Conditions)

Without protection from storm surge and associated erosion and saltwater intrusion, and without renewed inputs of freshwater, sediment, and nutrients, the project area is likely to convert from a predominately estuarine habitat to a predominately marine habitat. The benthic community that supports the estuarine system would be adversely affected. The species richness of the benthic community typically declines as in the transition from ocean waters into fresher areas. Consequently, it is expected that marine benthic community species diversity would increase in the project area as marsh loss continues. Wetland habitat in the study area may be improved under the No Action Alternative through LCA, CWPPRA, and other Federal, state, and local restoration programs.

1% AEP Alternative

Direct Impacts: Direct effects on benthic habitat include covering and smothering of benthic organisms in association with levee construction and similar activities in wetlands and aquatic habitats. Borrow material removed from aquatic and wetland habitats would result in a temporary loss of the benthic organisms followed by re-colonization from adjacent areas, however, because of a change in depth and other habitat characteristics, the structure of the benthic community may be altered.

Benthic communities would be covered with earthen materials at mitigation sites. However, this would be a short-term effect, and benthic communities would recover. Shallower depths and the potential for mitigation sites to support aquatic vegetation are likely to change the relative abundance and species composition of benthic communities.

Indirect Impacts: Introduction of freshwater flows from proposed features that change salinity regimes are likely to change benthic abundance, species composition, and species distribution. Maintaining existing habitat characteristics would prevent conversions of benthic communities to those of higher salinity habitats. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Cumulative Impacts: Cumulative impacts would primarily be related to the incremental impact of all past, present, and future actions affecting benthic resources. The incremental effects of the project would enhance aquatic resources when combined with other Federal, state, local, and private restoration efforts. Cumulative impacts would include the shifting of benthic abundance, species composition, and species distribution toward those characteristic of fresher habitats. The project would provide long-term significant benefits to aquatic organisms and the fisheries that depend on them.

3% AEP Alternative

Direct, indirect, and cumulative impacts associated with the 3% AEP would generally be similar to the 1% AEP but would affect a smaller area.

6.4.2 PLANKTON RESOURCES

No Action Alternative (Future without Project Conditions)

The No Action Alternative would result in the persistence of existing conditions including the continued degradation and eventual loss of wetlands. This loss of wetlands would eventually result in a decrease of available nutrients and detritus, which could lead to the conversion of primarily estuarine-dependent plankton species assemblages to more marine and open water plankton species assemblages. Wetland losses in the study area may be ameliorated under the No Action Alternative through Federal, state, and local restoration programs.

1% AEP Alternative

Direct Impacts: During construction of project features, there would be short-term minor adverse impacts to plankton populations due to increases in turbidity, low dissolved oxygen, and introduction of sediments into shallow open water areas. There would be a permanent loss of some shallow water habitat as it is filled and converted to levees and other project features.

Indirect Impacts: Increases in freshwater flows and associated nutrients from proposed features would be expected to change plankton abundance and species composition. Maintaining existing habitat characteristics would prevent conversions of plankton communities to those of higher salinity habitats. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Cumulative Impacts: Cumulative impacts would primarily be related to the incremental impact of all past, present, and future actions affecting plankton resources. The incremental effects of the project would enhance plankton resources when combined with other Federal, state, local, and private restoration efforts. Marsh restoration efforts would result in greater resources for phytoplankton and zooplankton due to export of dissolved organic compounds and detritus. Cumulative impacts would be the shifting of plankton community abundance, species composition, and species distribution toward those characteristic of fresher habitats. The project would provide long-term significant benefits to aquatic organisms and the fisheries that depend on them.

3% AEP Alternative

Direct, indirect, and cumulative impacts of the 3% AEP Alternative would generally be similar to those of the 1% AEP, but would affect a smaller area.

6.5 Fisheries

6.5.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITION)

Impacts to fisheries under the No Action Alternative are expected to be less significant than indirect impacts that could result from the continued loss of coastal marsh and habitat supportive of estuarine and marine fishery species (LCWCRTF and WCRA 1998; USACE 2010). Coastal marshes provide protection and an abundant food source and are critical to the growth and production of species including blue crab, white shrimp, brown shrimp, Gulf menhaden, Atlantic croaker, red drum, spotted seatrout, black drum, sand seatrout, spot, southern flounder, and striped mullet. Future commercial fishery harvests could be adversely impacted by the high rates of marsh loss throughout the study area.

As marshes subside and higher salinity waters expand farther inland, the area of nearshore habitat would increase; this expansion would benefit marine species. However, according to Coast 2050 projections for the study area and vicinity, food available for marine species, particularly estuarine-dependent species, would likely diminish. Therefore, marine species are expected to remain relatively stable in the future, unless the food availability declines in response to wetland habitat loss (LCWCRTF and WCRA 1998).

Brackish and saline marshes in the Timbalier Subbasin, in the central and eastern portions of the study area (Figure 5-2), are expected to convert to large lakes and bays, likely reducing habitat quality with little, if any, SAV. The conversion of marsh to open water could create temporary new oyster habitat. As surrounding marshes erode, oyster reefs would become increasingly vulnerable to storm damage (USACE 2010).

In the western portion of the study area, the influence of the Atchafalaya River is expected to gradually increase, more detail on which can be found in the engineering appendix to the PAC report. This increasing freshwater influence would shift production of estuarine-dependent fishery resources to species that are more tolerant of fresh water and low salinities, such as white shrimp, blue crab, Gulf menhaden, and red drum. Brown shrimp habitat quantity and quality would likely decrease in these areas. Areas suitable for oyster production would shift toward the southeast.

Restoration efforts in the State through programs such as LCA and CWPPRA have improved fisheries habitat and are likely to continue. Changes in fishing technology, fishing pressure, and fishing regulations may be necessary to maintain sustainable commercial fisheries (USACE 2010).

6.5.2 1% AEP ALTERNATIVE

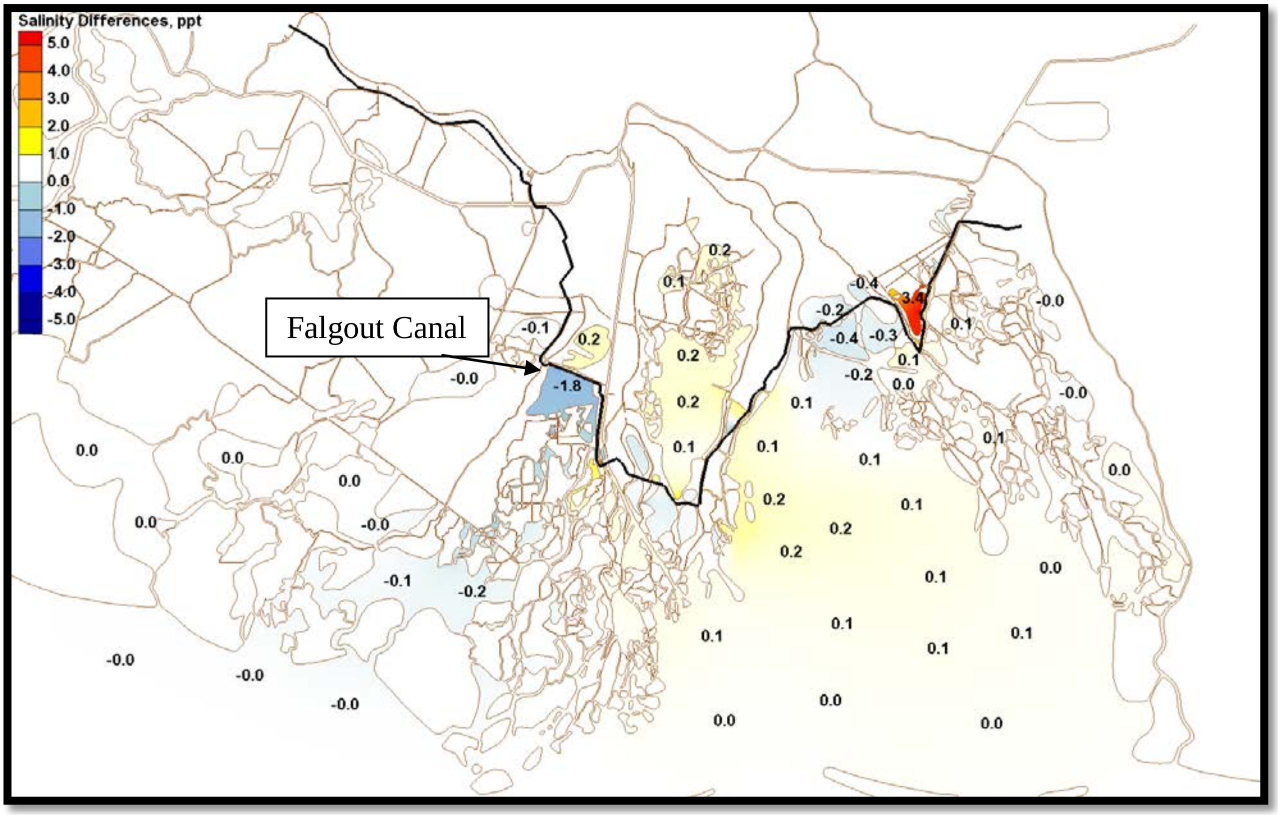
Direct Impacts

Programmatic Features: Construction of the 1% AEP Alternative, including the levee, structures, and other features in the proposed right of way would directly and permanently convert wetland and open water habitat to uplands and project features. This habitat conversion would be influenced by relative sea level rise and the time when the project feature is constructed. The direct impacts of the 1% AEP alternative on wetland and open water habitats based on low, intermediate, and high relative sea level rise scenarios are summarized in Table 6-1.

Impacts in the construction footprint and construction activities using earthen materials to create wetland mitigation areas along the proposed right of way could include the elimination of fishery habitat or the conversion of shallow open water habitats to less valuable deep water borrow canals, and direct mortality or injury of fisheries species due to burial or increased turbidity. Depending on the depth of the borrow canal this deeper water habitat could provide a refuge for during extreme water temperature spike.

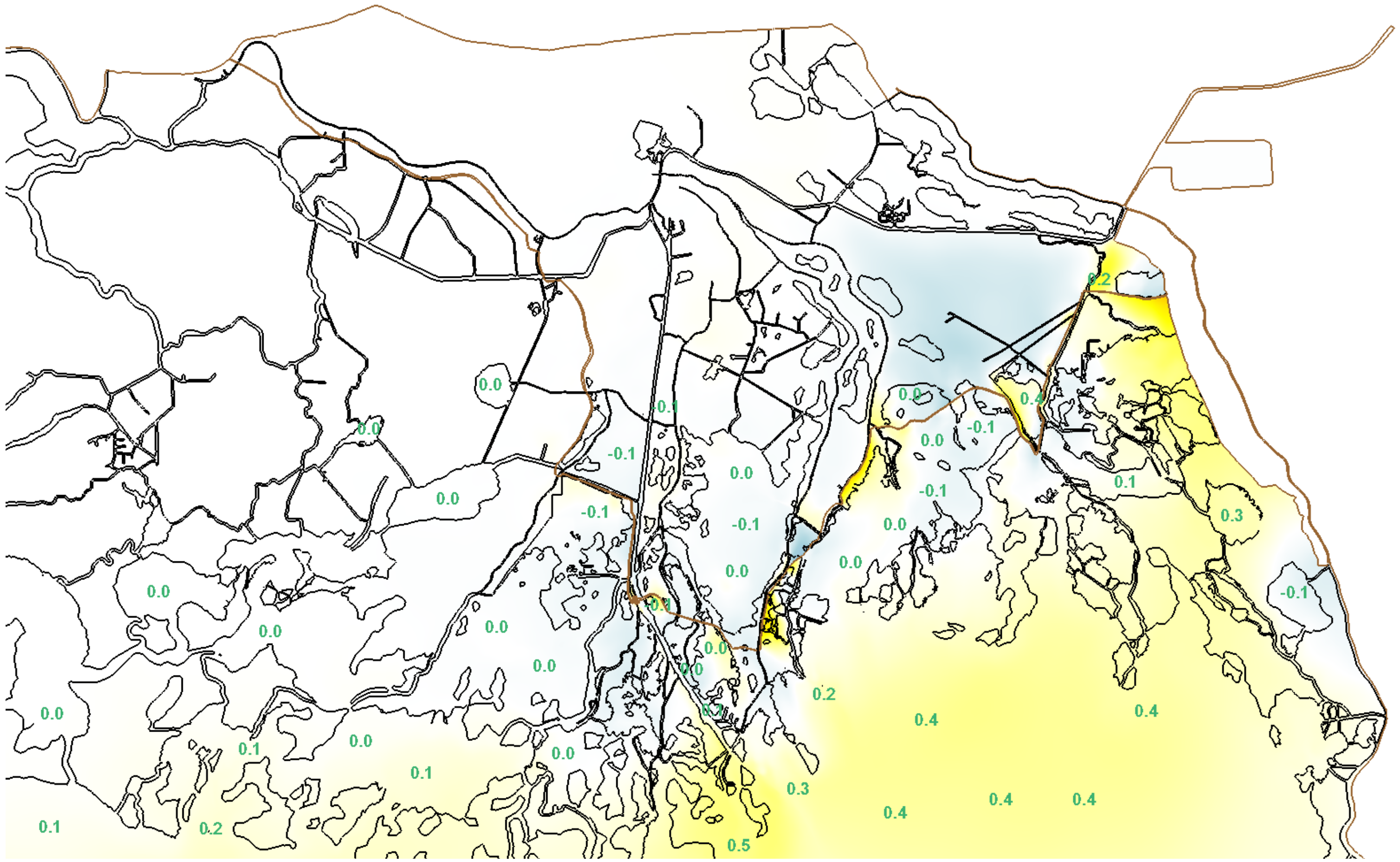
Construction activities using earthen materials to create wetland mitigation areas along the proposed right of way could cause oyster mortality due to burial, turbidity, or sudden salinity changes. Sessile and slow-moving aquatic invertebrates would be disturbed by the dredge or excavation activities or buried by the placed material. Construction activities would temporarily increase turbidity, water temperatures, and biological oxygen demand (BOD), and decrease dissolved oxygen. These temporary conditions would likely displace more mobile fisheries species from the construction area. Non-mobile benthic organisms could be smothered. These impacts would be minimized, as much as practicable, through implementation of appropriate Best Management Practices such as silt curtains, confinement dikes and berms.

Direct impacts to fisheries resources would also result from changes in salinity levels and water exchange in the project area. According to modeled salinity values, the 1% AEP Alternative would cause minimal global salinity changes (less than 1 ppt) under normal operating conditions (all environmental and floodgates on navigable waterways open, including the HNC lock complex), compared to the No Action Alternative. Impacts to water exchange inferred from the minimal changes to salinity would likely be minimal as well. The largest changes would occur in the marsh area south of Falgout Canal (Figure 6-3). This area would be newly connected to Falgout Canal through the installation of environmental control structures consisting of two sets of nine box culverts with sluice gates, allowing for new freshwater inflow to this area. The largest benefit would occur during the winter months; minimal freshening would occur during the summer months. Average salinity increases greater than 1.0 ppt would occur in the marshes between Bayou Pointe aux Chenes and Grand Bayou between reaches J-1 and K (red/orange-shaded area shown in Figure 6-3). The modeling of the Grand Bayou Unit on the Point au Chene Wildlife Management Area did not factor in local water management capabilities that would remain unchanged under the with-project condition. Therefore, it is likely that the predicted salinity increase would not occur as management of the Grand Bayou Unit will continue.



Source: McAlpin *et al*. 2012.

Figure 6-3. Average annual salinity differences (ppt) between No Action and Future with Project Condition (structures open)



Source: e-mail McAlpin 11-20-12.

The slight changes in salinities would likely have minor effects on the distribution of fish and shellfish species. Marine species assemblages and the young of species that prefer higher salinities such as brown shrimp and spotted seatrout could shift slightly Gulfward from areas freshened by water control structures. The young of species such as Gulf menhaden, blue crab, white shrimp, and red drum that commonly use low to medium salinity areas and SAV habitats and freshwater species, such as crayfish, freshwater catfish, largemouth bass, and other Centrarchids could slightly benefit in areas where salinities slightly decrease from implementation of the 1% AEP Alternative. Conversely, in areas where salinities slightly increase, the young of species that prefer higher salinities could move slightly inland.

Reductions in salinity due to the project would likely have minor effects on oysters. Expected slight decreases in salinity in the marshes south of Falgout Canal would likely have little effect on oyster leases and seed grounds south of this area (Figure 5-7).

Organism access to marsh and open-water areas would be impeded by some features included in this alternative and would be enhanced by others. Fishery access impacts by feature are summarized in Table 6-3. Features with a potentially beneficial influence on fish access include environmental control structures along Falgout Canal in Reach B. In some areas, the proposed levee would restrict fish access to floodgates on navigable waterways and environmental structures only.

Table 6-3. Levee/Flood Gate Structures and Potential Fishery Access Impacts

Levee	Fishery access is limited to canals and bayous due to existing uplands and development along Bayou Black	Fishery access would be blocked except through culverts and floodgates on navigable waterways.
Environmental control structures (seven sets of six 6’x6’ box culverts with sluice gates)	Small bayous and canals currently open for fishery access	Minimal impacts under normal operating conditions (environmental structures open)
Bayou Black Canal Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Shell Canal West Stop Log Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Shell Canal East Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Elliot Jones Canal Stop Log Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Humphreys Canal Stop Log Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access exists but may be limited to trenasses through marsh habitat	Fishery access would be blocked except through culverts and floodgates on navigable waterways.
Environmental Control Structures (one set of box culverts with sluice gates)	Fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)

Minors Canal Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
GIWW West of Houma Sector Gate with Sluice Gates	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access is limited to Marmande Canal, Pipeline Canal, and Falgout Canal due to existing uplands along Thibodaux Canal	Fishery access through Pipeline Canal would be blocked but maintained on Marmande Canal and Falgout Canal through floodgates on navigable waterways
Marmande Canal Stop Log Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Falgout Canal Sector Gate with Sluice Gates	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access blocked along Falgout Canal	Fishery access north to south would have slight improvement by placement of flapped culverts in levee
Environmental Control Structure (two sets of box culverts with sluice gates)	Fishery access blocked along Falgout Canal	Beneficial impacts to water flow and fish access under normal operating conditions (environmental structures open)
Bayou Du Large Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Small bayous and canals currently open for fishery access to HNC	Fishery access to the HNC would be blocked except through floodgates on navigable waterways
Bayou Grand Caillou Sector Gate with Sluice Gates	Fishery access exists	Minimal impacts under normal operating conditions (structures open)
Houma Navigational Canal Sector Gate, Lock, and Sluice Gates	Fishery access exists	Minimal impacts under normal operating conditions (structures open)
Levee	Fishery access to Four Point Bayou, Deep Bayou, Sweetwater Pond, and other open-water areas exists	Fishery access blocked except through floodgates on navigable waterways and culverts
Environmental Control Structures (three sets of box culverts with sluice gates)	Fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)
Bayou Four Points Stop Log Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	H-1: Fishery access is blocked along Grassy Bayou H-2, 3: Open fishery access to bayous, marshes, and open-water areas exists	H-1: Fishery access would be improved by placement of culverts in levee H-2, 3: Fishery access blocked except through floodgates on navigable waterways and culverts

Environmental Control Structures (two sets of box culverts with sluice gates)	Fishery access is blocked along Grassy Bayou	Beneficial impacts to water flow and fish access under normal operating conditions (environmental structures open)
Bayou Petit Caillou Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Placid Canal Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Bush Canal Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access is limited to canals due to existing uplands along Bayou Terrebonne	Minimal impacts to fishery access
Bayou Terrebonne Sector Gate	Fishery access exists	Existing structure would be replaced with new sector gate. Minimal impacts under normal operating conditions (structure open)
Humble Canal Sector Gate	Fishery access exists	Existing structure would be replaced with new sector gate. Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access exists to bayous, marshes, and open-water areas	Fishery access blocked except through floodgates on navigable waterways and culverts
Environmental Control Structures (three sets of box culverts with sluice gates)	Fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)
Bayou Pointe Aux Chenes Sector Gate	Fishery access exists	Minimal impacts under normal operating conditions (structure open)
Levee	Fishery access is limited to canals due to existing uplands along the Cutoff and Grand Bayou canals	Fishery access would be improved by placement of culverts in levee
Environmental Control Structures (two sets of box culverts with sluice gates)	Fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)
Levee	Open fishery access to bayous, marshes, and open-water areas in the immediate area	Fishery access would be closed except through floodgates on navigable waterways and environmental structures
Environmental Control Structure (one set of box culverts with sluice gates)	Fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)
Grand Bayou Sector Gate with Sluice Gates	Fishery access exists	Minimal impacts under normal operating conditions (structures open)
Levee	Fishery access is limited to canals due to existing uplands	Minimal impacts to fishery access

Larose Floodgate	A floodgate is already in place. Fishery access is open when the structure is open.	No impacts under normal operating conditions (structure open)
Levee	Some fishery access exists	Fishery access would be closed except through environmental structures
Environmental Control Structures (two sets of box culverts with sluice gates)	Some fishery access exists	Minimal impacts under normal operating conditions (environmental structures open)
During PED these structures would be designed and evaluated using the most up to date method to reduce any potential impacts to aquatic organism ingress and egress.		

Constructible Features: Direct impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features. However, because the constructible features are located in a much smaller area, the impacts would be greatly reduced. Direct impacts are summarized in Table 6-1.

Indirect

Programmatic Features: Improved marsh habitats and increased SAV could benefit juvenile fishes, shrimp, crabs, and other species by increasing food and cover if they are able to access the area. Portions of the project area expected to benefit from improved marsh habitat as a result of the 1% AEP Alternative would be expected to better maintain most of its current ability to support GMFMC-managed species (including white and brown shrimp and red drum), as well as other estuarine-dependent species (including spotted seatrout, Gulf menhaden, striped mullet, and blue crab) preyed upon by other GMFMC-managed species (such as mackerels, red drum, snappers, and groupers) and highly migratory species (such as billfish and sharks). Potential increases in SAV could increase the habitat available to escape predation for juveniles of some species. Despite some areas of adverse impacts on wetland habitat, an overall improvement in marsh habitats and increased SAV would benefit fisheries under the historic SLR in the near term. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Constructible Features: Indirect impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features in the near term but could become adverse.

Cumulative

When combined with LCA, CWPPRA, and other Federal, state, and local restoration efforts, the net benefit associated with the 1% AEP Alternative could have an incremental benefit on fisheries resources. Fish and shellfish populations would benefit from the cumulative habitat benefits of the 1% AEP Alternative and restoration programs in the study area.

6.5.3 3% AEP Alternative

Direct Impacts

<u>Programmatic Features</u>: Direct impacts of the 3% AEP would generally be similar to the 1% AEP Alternative but fewer acres would be affected. Construction of the programmatic features of the 3% AEP Alternative would directly and permanently convert marsh habitat and open water habitat to uplands and project features. Acreages affected are listed in Table 6-2.

<u>Constructible Features</u>: Direct impacts to fish and shellfish from activities associated with constructible features of the 3% AEP Alternative would be the similar to those of the 1% AEP Alternative. Table 6-2 provides acreages and AAHUs associated with habitat conversion.

Indirect

<u>Programmatic Features</u>: Indirect impacts of the 3% AEP Alternative would generally be similar to those of the 1% AEP Alternative.

<u>Constructible Features</u>: Indirect impacts to fish and shellfish from activities associated with constructible features of the 3% AEP Alternative would be the same as those of the 1% AEP Alternative.

Cumulative

Cumulative impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

6.6 Essential Fish Habitat (EFH)

6.6.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Continued land loss, conversion of habitats, and sea level change, in the project area are expected to lead to a net decrease in the habitat most supportive of estuarine and marine species. Under the No Action alternative, the conversion of categories of EFH, such as estuarine marsh and SAV, to marine water column and mud, sand, or shell substrates is expected to continue. Over time, emergent marsh would be converted to open water. Decreases in the quality of EFH in the project area would reduce the area's ability to support federally managed species.

Population reductions of directly affected species, such as brown and white shrimp, would indirectly affect species dependent on shrimp for food. As marsh, barrier islands, and other EFH are directly lost, less protection would be available to the remaining EFH. These areas would be more susceptible to storm, wind, and wave erosion. A decrease in species productivity would result as populations are stressed by habitat displacement and reduction.

EFH in the study area may be improved under the No Action Alternative through LCA, CWPPRA, and other Federal, state, and local restoration programs.

6.6.2 1% AEP ALTERNATIVE

Direct Impacts

Programmatic Features: Construction of the 1% AEP Alternative, including the levee, structures, and other features in the proposed right of way would directly and permanently convert wetland and open water habitat to uplands and project features. This habitat conversion would be influenced by relative sea level rise at the time when the project feature is constructed. The direct impacts of the 1% AEP alternative on wetland and open water habitats based on low, intermediate, and high relative sea level rise scenarios are summarized in Table 6-1.

Impacts in the construction footprint and construction activities using earthen materials to create wetland mitigation areas along the proposed right of way could include the elimination of EFH and increased turbidity.

Construction activities using earthen materials to create wetland mitigation areas along the proposed right of way could bury EFH substrates or temporarily change environmental conditions, including turbidity and salinity, in the water column. These impacts would be minimized, as much as practicable, through implementation of appropriate Best Management Practices. The project would increase SAV and adjacent intertidal marsh vegetation (marsh creation areas) in some areas and decrease vegetation in other areas (levee construction areas).

Constructible Features: Direct impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features. However, because the constructible features are located in a much smaller area, the impacts would be greatly reduced. Direct impacts are summarized in Table 6-1.

Indirect Impacts

Programmatic Features: Indirect effects to EFH from the construction of levee, structures, and other features include loss of habitat function and changes in hydrologic patterns. Indirect and cumulative impacts to wetlands, fisheries, and EFH likely would result from potential degradation of water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine dependent fishery species access to nursery and foraging habitat. Aquatic habitats support various life stages of fish species and their prey, including spawning, breeding, feeding, and growth to maturity. The levee, structures, and other features in the proposed right of way could limit or eliminate organism access to some EFH and enhance access in other areas. However, these impacts are expected to be minor. The project would increase SAV and adjacent intertidal marsh vegetation (marsh creation areas) in some areas and decrease vegetation in other areas (levee construction areas). Changes in hydrologic patterns could alter water chemistry composition through suppressed mixing of fresh and saltwater, decreased sediment and nutrient delivery, and degraded water quality through thermal loading. Based on the minimal modeled changes to salinity, the impacts to water exchange are also expected to be minimal in the near term. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Constructible Features: Indirect impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features in the near term. Mitigation for the indirect impacts of the constructible features should offset some of the adverse impact to EFH.

Cumulative

The incremental effects of the proposed project would contribute to effects associated with other coastal projects, including LCA, CWPPRA, and other Federal, state, and local restoration programs. The overall cumulative effects of these projects could be the maintaining of EFH along a greater portion of the Louisiana coastline, thereby reducing any adverse effects of local disturbances on EFH.

6.6.3 3% AEP Alternative

Direct Impacts

Programmatic Features: Direct impacts of the 3% AEP would generally be similar to the 1% AEP Alternative but fewer acres would be affected. Construction of the programmatic features of the 3% AEP Alternative would directly and permanently convert marsh habitat and open water habitat to uplands and project features. Acreages affected are listed in Table 6-2.

Constructible Features: Direct impacts to EFH from activities associated with constructible features of the 3% AEP Alternative would be the similar to those of the 1% AEP Alternative. Table 6-2 provides acreages and AAHUs associated with habitat conversion.

Indirect

Programmatic Features: Indirect impacts of the 3% AEP Alternative would generally be similar to those of the 1% AEP Alternative.

Constructible Features: Indirect impacts to EFH from activities associated with constructible features of the 3% AEP Alternative would be the same as those of the 1% AEP Alternative.

Cumulative

Cumulative impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

6.7 Wildlife

6.7.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Throughout most of the study area, wildlife abundance is expected to decline. This projection is based primarily on the ongoing conversion of marsh to open water and the gradual subsidence of forested habitat (LCWCRTF and WCRA 1998). However, wildlife habitat is expected to improve in those areas receiving increased fresh water as the Atchafalaya River Delta matures.

The abundance of seabirds, wading birds, shorebirds, raptors, and other birds using marsh and open water habitats is expected to decrease in deteriorating wetland areas. Waterfowl populations, such as puddle ducks, diving ducks, and coots; and migratory species, such as rails and gallinules, are expected to decline in eastern and central Terrebonne Parish. Furbearer and alligator populations are expected to decrease in deteriorating wetlands of the Terrebonne-Timbalier Bay area and near lakes Mechant and de Cade (Figure 3-1).

The abundance of raptors and other birds using hardwood forests is expected to decrease as a result of expected subsidence, increasing water levels, and decreasing diversity in forested communities. Squirrel, rabbit, and white-tailed deer numbers are expected to decline as well.

The fresh marshes near the Atchafalaya River and Bayou Penchant would likely expand from increasing amounts of fresh water, nutrients, and sediments as the Atchafalaya River Delta matures. Habitat quality for waterfowl and alligators would remain high throughout most of this area. Brown pelican and bald eagle numbers are projected to increase in areas presently occupied (LCWCRTF and WCRA 1998, USACE 2010).

Wildlife habitat in the study area may be improved under the No Action Alternative through LCA, CWPPRA, and other Federal, state, and local restoration programs. For example, the LCA project, *Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock* would redistribute existing freshwater to prevent, reduce, and/or reverse future wetland loss and sustain productive fish and wildlife habitat in Terrebonne Parish (USACE 2010).

6.7.2 1% AEP ALTERNATIVE

Direct Impacts

Programmatic Features: Construction of the 1% AEP Alternative, including the levee, structures, and other features in the proposed right of way would directly and permanently convert wetland and open water habitat to uplands and project features. This habitat conversion would be influenced by relative sea level rise and the time when the project feature is constructed. Table 6-1 summarizes the direct impacts of the 1% AEP alternative on wetland and open water habitats based on low, intermediate, and high relative sea level rise scenarios. Affected wetland habitats include bottomland hardwood forest; swamp; and fresh, intermediate, brackish, and salt marshes. Greater detail may be found in Appendix F, *Wetland Value Assessment.*

Construction activities using earthen materials to create wetland mitigation areas along the proposed right of way would also result in unfavorable conditions for wildlife nesting, foraging, and other activities. However, displacement associated with the creation of the mitigation areas would be temporary; wildlife habitat would be enhanced in these areas once wetland habitat is established in the future. Table 6-1 lists acres of wetland habitat would be created in the mitigation areas.

Wildlife species using the marsh and open water habitat in the proposed right of way could easily avoid disturbances associated with construction activities. Birds would have ample alternative locations available for use. Mammals or reptiles that may inhabit the proposed construction areas would likely react to disturbances by relocating to adjacent marsh or open water habitats. Once the levee is constructed, it would provide additional upland habitat that may be valuable to some terrestrial wildlife species, such as snakes, lizards, terrapins, and rodents.

In order to minimize any potential impacts to nesting bald eagles that may be found in the project area, project implementation would follow the National Bald Eagle Management Guidelines. The guidelines recommend:

- maintaining a specified distance between the activity and the nest (buffer area),
- maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers), and
- avoiding certain activities during the nesting season.

On-site personnel would be informed of the possible presence of nesting bald eagles within the project boundary, and would identify, avoid, and immediately report any such nests to the proper authorities. If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation would be performed, in coordination with LDWF, to determine whether the project is likely to disturb nesting bald eagles.

<u>Constructible Features</u>: Direct impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features. However, because the constructible features are located on a much smaller area, the impacts would be greatly reduced. Table 6-1 summarizes the direct impacts.

Indirect

<u>Programmatic Features</u>: Indirect impacts to wildlife resources resulting from the 1% AEP Alternative would include the creation, restoration, and protection of wetland habitat used by wildlife species for nesting, rearing of young, resting, and foraging activities.
<u>Constructible Features</u>**:** Indirect impacts associated with constructible features of the project would be similar in nature to those associated with the programmatic features.

Cumulative

When combined with LCA, CWPPRA, and other Federal, state, and local restoration efforts, the net benefit associated with the 1% AEP Alternative could provide a no net loss on wildlife resources. However, given the historic declines in such habitat due to sea level rise and development pressures, the quality and quantity of this habitat is likely to continue to decrease, but at a much slower rate. Populations of migratory avian species, such as neotropical songbirds and waterfowl, could initially improve and stabilize as critical migratory habitat is protected and enhanced, over time though these populations would continue to decline along with the habitat. Game animals, furbearers, reptiles, amphibians, and invasive species would experience the same cumulative effects of the 1% AEP Alternative and restoration programs in the study area.

6.7.3 3% AEP ALTERNATIVE

Direct Impacts

Programmatic Features: Direct impacts of the 3% AEP would generally be similar to the 1% AEP Alternative but with fewer acres affected. Construction of the programmatic features of the 3% AEP Alternative would directly and permanently convert marsh habitat and open water habitat to uplands and project features. Acreages affected are listed in Table 6-2.

Constructible Features: Direct impacts to wildlife from activities associated with constructible features of the 3% AEP Alternative would be the similar to those of the 1% AEP Alternative. Table 6-2 provides acreages and AAHUs associated with habitat conversion.

Indirect

Programmatic Features: Indirect impacts of the 3% AEP Alternative would generally be similar to those of the 1% AEP Alternative.

Constructible Features: Indirect impacts to wildlife from activities associated with constructible features of the 3% AEP Alternative would be the same as those of the 1% AEP Alternative.

Cumulative

Cumulative impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

6.8 Threatened and Endangered Species

6.8.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Under the No Action Alternative, the project area is expected to continue to lose estuarine wetland habitats used by fish and wildlife species for shelter, nesting, feeding, roosting, cover, nursery, and other life requirements. The loss and deterioration of wetland habitat over time may adversely affect listed species that may be found in the project area, including: the piping plover, Gulf sturgeon, and Kemp’s ridley sea turtle. Adverse effects to protected species habitat in the study area may be mediated under the No Action Alternative through LCA, CWPPRA, and other Federal, state, and local restoration programs.

6.8.2 1% AEP ALTERNATIVE

The orginal Biological Assessment (Appendix A) prepared by the CEMVN assessed the impacts of the project on the following threatened/endangered species:

- Gulf sturgeon

- Kemp’s ridley sea turtle
- Loggerhead sea turtle
- Green sea turtle
- Leatherback sea turtle
- Hawksbill sea turtle
- Piping plover
- Finback whale
- Humpback whale
- Right whale
- Sei whale
- Sperm whale

The BA associated with the 2002 feasibility report concluded, “Neither of the two action alternatives would have adverse impacts upon threatened and endangered species provided work areas do not expand to the south of the study area. . .”

As part of the ESA Section 7 consultation process also associated with the 2002 feasibility report, the NMFS concluded, by letter of March 18, 2002 (Appendix H), “. . .the proposed action is not likely to adversely affect any listed species under NMFS’ purview for any of the plan alternatives.”

It should be noted that the alternatives examined in the 2002 feasibility report are similar, but not exactly the same, as the two action alternatives in this RPEIS and associated PAC report. There is no longer plans to look offshore for sand. It is the USACE determination that there would be No Affect to Threatened or Endangered Species or their critical habitat due to the Morganza to the Gulf Risk Reduction Project

Direct

No direct impacts on threatened or endangered species would result from implementation of the 1% AEP Alternative.

Indirect

Implementation of the 1% AEP Alternative could partially offset the loss of coastal habitats thereby benefiting threatened and endangered species dependant on these habitats.

Cumulative

The incremental effects of the proposed project could contribute to beneficial effects associated with other coastal projects, including LCA, CWPPRA, and other Federal, state, and local restoration programs. The overall cumulative effects of these projects would be the maintaining of coastal habitats along a greater portion of the Louisiana coastline, thereby reducing any adverse effects of local disturbances on threatened or endangered species.

6.8.3 3% AEP ALTERNATIVE

Direct, indirect, and cumulative effects would be similar to those described for the 1% AEP Alternative.

6.9 Noise

6.9.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

The No Action Alternative would not increase ambient noise levels in the project area. Therefore, no effects to noise are expected to result due to selection of this alternative.

6.9.2 ACTION ALTERNATIVES

Direct and Indirect

Depending on the distance of people and property to construction areas, heavy machinery associated with construction of the 1% and 3% AEP alternatives could result in nuisance noise. One construction activity, pile driving, may cause temporary noise impacts above 70 dB. Because of the proximity of some of the project features to developed areas, there are a number of residential and commercial properties that could be exposed to adverse impacts from construction noise. Noisy construction activities, such as pile driving, would likely be limited to daylight hours. To protect construction workers from hearing impairment, regulations for Occupational Noise Exposure (29 CFR Part 1910.95) under the Occupational Safety and Health Act of 1970, as amended, would be followed. This section mandates that noise levels emitted from construction equipment be below 90 dB for exposures of eight hours per day or more.

Localized and temporary noise impacts would likely result in wildlife and fishery resources temporarily leaving construction areas during construction activities. The animals could easily relocate to areas of less noise during such times. If it is determined that a key species of concern is present, then the team would follow feasible administrative and/or engineering controls, determine and implement appropriate buffer zones, and implement construction activity windows.

Cumulative

Cumulative impacts to noise levels resulting from implementation of the action alternatives would be related to the potential short-term disruption of fish and wildlife species and similar impacts by other Federal, state, local and private restoration activities, as well as by other human-induced noise disruptions to these organisms. However, during noise-producing activities, these organisms may re-locate to numerous other locations in the project area. Long-term adverse cumulative impacts due to noise levels would not be expected with implementation of the action alternatives.

6.10 Air Quality

6.10.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Selection of the No Action Alternative would not affect air quality.

6.10.2 ACTION ALTERNATIVES

Direct

Direct impacts to ambient air quality would be temporary and localized, resulting primarily from the emissions of construction equipment and from fugitive dust or airborne particulate matter from earthwork and unpaved roads accessed for the project. These effects to air quality would be temporary, and air quality would return to pre-construction conditions shortly after the completion of construction activities. Earthen materials used for wetland mitigation areas would remain wet and would not become airborne. In an e-mail message from the LDEQ on January 15, 2013, it was confirmed that Lafourche Parish is designated as “in attainment” for ozone standards and, therefore, is not required to meet the general conformity requirements for construction. No mitigation measures are necessary because Lafourche Parish is not required to conform to the *de minimis* levels of emissions. However, best management practices would be utilized to reduce all air emissions and particulate matter during construction.

Indirect

Potential indirect impacts would be related to very minor air quality improvements from maintaining/improving vegetated wetlands provided by the project. Marshes can have a positive impact on air quality by removing gaseous and particulate air pollutants. While the generation of methane from bacterial decomposition of organic matter in marshes can contribute to greenhouse gas effects and resultant climate change, the effects from the proposed project are considered negligible.

Cumulative

A minor beneficial cumulative effect to air quality in the project area may occur as a result of the numerous marsh restoration projects in the project area (see Section 3.0 Related Projects). The reestablishment of marshes may have a positive impact on air quality by removing gaseous and particulate air pollutants.

6.11 Hydrology

Material in this section was extracted and summarized from the engineering appendix to the PAC report.

6.11.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Building of the Atchafalaya River delta would continue to impact stages on the Lower Atchafalaya River. As stages increase, the flow passing through the Bayou Lafourche ridge in the GIWW would increase. Areas hydraulically isolated from the GIWW would continue to be isolated.

Monthly averaged flows along the GIWW would range from over 700 cfs to 28,000 cfs. These flows would generally decrease from west to east. The largest loss of flow would continue to be through the HNC, with monthly averaged flows ranging from 2,500 to 7,000 cfs. At times, flow reversals would occur throughout the project area.

Flow would enter and leave the Lake Boudreaux basin through Bayou Dulac, Robinson Canal, and Boudreaux Canal. Bayou Dulac monthly averaged flows would range between 50 and 400 cfs. Robinson monthly averaged flows would be fairly steady near 1,500 cfs with higher monthly averaged flows near 1,700 cfs from March through June. Boudreaux Canal monthly averaged flows would be fairly steady around 500 cfs with higher monthly averaged flows near 700 cfs from March through June.

Monthly averaged flows into Grand Bayou would range between 0 and 575 cfs. Stages within the project area would be tidally driven with effects from the Atchafalaya River. Over the project life, water surface elevations would increase due to sea level rise.

6.11.2 ACTION ALTERNATIVES

Direct and Indirect Impacts

A system wide model was used to determine the impacts of the project on hydrology and salinity. The system wide model verified that water control features would have no significant impact on salinities in the project area. In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site, ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. The validated model (McAlpin 2012) for calendar year 2004 was modified to include three levee system configurations and was used to compare the existing without-project conditions to with-project conditions. All three plan configurations represent operation during non-tropical storm conditions. During tropical storm conditions, all structures would be closed. A comprehensive analysis was performed on the water surface elevations, discharges, and salinity to obtain an approximate indication of the resulting behavior of the system if the proposed changes were to occur. The environmental structures consist of collections of culverts, and the floodgates on navigable waterways consist of different configurations of sluice and sector gates. The three conditions or “plans” are described below.

Plan 1 - All structures in the open position. The purpose of modeling this condition is to determine the scale of hydrodynamic and salinity impacts of the Morganza project under everyday non-storm conditions. Plan 1 possesses minimal global salinity changes with the largest changes occurring in the marsh area south of Falgout Canal. This area is newly connected to Falgout Canal allowing for a new freshwater inflow to this area which in turn reduces the salinity (about 3 ppt) with the largest benefit occurring during the winter months and minimal benefit occurring during the summer months. Globally, the salinity changes tend to be less than 1 ppt. Minimal change in tide range, average water surface elevations (less than 0.1 ft in most areas) and discharge for most areas would occur.

Plan 2 - All floodgates on navigable waterways in the open position with all environmental structures in the closed position. This condition would never occur under the current structure operation plan, but was modeled to isolate the effects of the environmental control structures. The structure operation plan for storm surge is to leave all structures open during everyday non-storm conditions and to close them during high water levels due to storm conditions. Plan 2 has minimal global salinity changes (less than 2 ppt) with some increased salinity possible in local areas newly cutoff by the proposed levee system. Plan 2 has some areas that possess no connection to the remainder of the domain (due to closed environmental structures) and therefore would remain stagnant with constant water levels and salinity. Minimal change in tide range, average water surface elevations (less than 0.1 ft in most areas) and discharge for most areas would occur.

Plan 3 - All structures in the open position with the exception of the HNC structure and lock in the closed position. This condition represents operation of the HNC lock complex for salinity control and would occur whenever certain salinity criteria are met at designated monitoring stations. Plan 3 has noticeable salinity changes along the HNC. Salinity increases along the southern portion (~4 ppt) and lowered north of the HNC structure. The Falgout Canal and Lake Boudreaux areas would be freshened as the closed HNC structure forces the freshwater flow to divert along other avenues, thereby freshening the surrounding areas.

Sensitivity simulations demonstrated the importance of the two GIWW structures. Reducing the size of the western structure reduces the freshwater inflow able to enter the Morganza levee system and thereby increases the salinity in the study area. Conversely, reducing the size of the eastern GIWW at Larose structure reduces the amount of freshwater able to leave the system and therefore decreases the salinity in the study area. While navigational concerns require certain structure sizes for these two areas, those simulations exhibit the type of control the new levee system would provide operators. Through proper management of the planned structures a number of different salinity results, both beneficial and not, can be accomplished. The results indicate that if structures are properly operated, the proposed levee system would have a minimal effect on the global salinity values. If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design was also safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.

Cumulative Impacts

Hydrology cumulative impacts would be the incremental impacts of the direct and indirect impacts (see Section 6.11.2) of the proposed Morganza to the Gulf levee in addition to the direct and indirect impacts of all past, present and future hurricane and storm damage risk reduction projects (see Section 2.7 of the PAC) in Terrebonne and Lafourche parishes, as well as Louisiana and the nation. Cumulative hydrology impacts of the proposed 98-mile levee would be primarily related to the 14 crossings of open water because the majority of the proposed levee would be constructed along existing hydrologic barriers including natural ridges, road beds and existing levees. Additional cumulative hydrology impacts of the proposed action would be related to the direct and indirect impacts of environmental control structures and floodgates on navigable waters (see Section 6.11.2) in addition to the direct and indirect impacts of all past, present and future projects with environmental control structures and floodgates on navigable waters (see Section 2.7).

6.12 Water Quality

6.12.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Without the proposed Morganza to the Gulf project, the study area would continue to be affected by natural and man induced activities that would have beneficial and detrimental impacts to water quality. Some of these activities include: other Federal, state, local, and private restoration efforts such as CWPPRA, USACE ecosystem restoration projects, various NRCS programs (e.g., Coastal Wetlands Restoration Program), and LDNR projects; state and local water quality management programs; national level programs to address hypoxia in the northern Gulf of Mexico; the continued erosion/subsidence of the coast; oil and gas development; industrial, commercial, and residential development; and Federal, State, and municipal navigation and flood damage reduction projects.

An assessment of water quality impacts associated with the flooding of structures during tropical storms and hurricanes is dependent upon flooded structure types, densities, and the materials contained by these structures likely to be released into floodwaters. For flooded areas containing a high density of residential structures, floodwaters would be expected to have characteristics similar to urban runoff, which in general contains elevated biochemical oxygen demand and suspended and dissolved solids, pathogens, oil and grease, other automotive and household chemicals, pesticides, fertilizers, and heavy metals. For areas dominated by commercial structures/facilities, impacts cannot be generalized as easily, and would be in part dependent upon materials in storage likely to be released.

In 2005, hurricanes Katrina and Rita flooded significant portions of New Orleans, an urban area with a high density of residential and commercial development. During the dewatering of flooded areas in New Orleans, the USGS collected water samples within Lake Pontchartrain and its outlets to assess the quality of Lake Pontchartrain as affected by floodwaters (USGS 2007). Overall, samples were found to contain contaminants commonly present in urban runoff, including elevated nutrients, metals, and organics. With the exceptions of nickel, copper, and silver, no concentrations in water samples collected by the USGS exceeded EPA marine water quality criteria.

In comparison to New Orleans, the Morganza to the Gulf of Mexico Hurricane Protection project study area is less densely populated. Therefore, in general, it is anticipated that under without project conditions, water quality associated with flooded structures would resemble a diluted version of waters sampled in Lake Pontchartrain and its outlets by the USGS following hurricanes Katrina and Rita.

6.12.2 1% AEP ALTERNATIVE

Direct Impacts

As the proposed project entails construction of approximately 98 miles of levee, it would have significant direct impacts for areas within the proposed footprint that currently consist of wetlands and open water. These areas would be converted into upland habitat and would no longer provide for 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 footprint. These wetland losses and their effects, however, would be mitigated through wetland restoration actions.

In addition, direct impacts resulting from construction activities are anticipated. The excavation and placement of borrow material for levee fill, as well as dredging and dredged material placement activities associated with flotation access channel construction, would result in localized increases in turbidity and suspended solids, at both the dredging and placement sites. Sediment chemistry for sample sites representative of adjacent borrow indicate the presence of low level contamination in some sediments proposed for use as levee fill. Because the method of excavation and placement (mechanical dredging) minimizes water column impacts from placement activities, and includes dewatering, it is not anticipated that the use of adjacent borrow for levee fill would have significant impacts on the receiving aquatic environment. In addition, because adjacent borrow material is expected to have characteristics similar to sediments present at the proposed placement sites, no significant changes in sediment quality at the placement sites are anticipated.

Construction of structures (i.e., floodgates, tidal exchange structures, and the locks) would result in localized increases in turbidity associated with runoff of construction materials. To minimize construction related impacts, 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.

A Clean Water Act Section 404(b)(1) evaluation is included in Appendix C. An application for a state Water Quality Certificate is provided in Appendix I.

Indirect Impacts

The proposed hurricane risk reduction project could have significant indirect impacts on study area water quality, the extent to which is largely unknown. Based on historical water quality information for the study area, it is clear that a majority of the water quality problems within the study area occur on the protected side of the proposed levee alignment. Although proper management of tidal exchange structures can minimize changes in flow and water level between the flood and protected side of the proposed levee alignment, it is a legitimate concern that the proposed alignment would cause significant alteration of hydrology and hydraulics in the study area, such that water exchange between the protected and flood sides of the proposed levee alignment is significantly inhibited, and that localized areas of stagnation behind the levee alignment may occur. If these conditions present themselves, the levee alignment would serve as a barrier between relatively free of contamination Gulf of Mexico waters and impaired waters, further exacerbating water quality conditions on the protected side of the alignment. Moreover, the potential expansion of developed areas as a result of the project could lead to additional point and nonpoint discharges within the hurricane risk reduction system, which would further degrade water quality on the protected side of the proposed alignment. Also, as sea level rise increases water levels in the study area, the frequency with which tidal structures are closed would be expected to increase, causing further stagnation for waters on the protected side of the proposed levee alignment.

The proposed project could also prevent the introduction of mineral sediments from the flood side to the protected side. Mineral sediments are known to stimulate the growth of marsh vegetation, and input of mineral sediments associated with tropical activity can raise ground elevations, helping marshes to keep pace vertically with sea level rise. A lack of sediment input to the protected side of the proposed levee system could lead to the conversion of marsh substrate to predominantly organic substrate, creating a situation similar to that which occurs in areas subject to river water influx without mineral sediment input. Current examples include portions of the Penchant Basin which receives Atchafalaya River water input, and the marsh area beyond Big Mar which receives river water input via the Caernarvon Freshwater Diversion. This lack of sediment input could make marshes more vulnerable to erosional forces, leading to a further reduction in water quality on the protected side of the proposed levee alignment. A major potential benefit of the project is that it would provide for the protection of marshes on the flood side of the proposed levee alignment, potentially extending the lifespan of these marshes. However, the marshes just outside of the hurricane risk reduction system are expected to be subjected to an increase in wave energy as a result of the proposed project, which could lead to the accelerated loss of unprotected marsh vegetation. This detracts from rationale for utilizing the topmost organic sediment layer of adjacent levee borrow areas for marsh construction on the flood side of the proposed levee alignment. All of these impacts to wetlands habitat would affect water quality.

Further protection of structures within the study area from flooding would reduce water quality impacts as they relate to these structures. However, it should be noted that in some areas outside of the proposed levee alignment, storm surge elevations would be higher for future with project conditions than for future without project conditions, due to amplification of storm surge along the proposed alignment. This could in turn increase the severity of flooding and wave energy on structures outside the proposed alignment, resulting in greater water quality impacts in association with these structures. However, these impacts are generally anticipated to be less than those that would occur in the study area without the proposed alignment, and would again be expected to be a dilute rendition of waters sampled in Lake Pontchartrain and its outlets by the USGS following hurricanes Katrina and Rita. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Cumulative Impacts

The proposed project, combined with other coastal activities (such as those included in the discussion of future without project conditions) would cumulatively impact study area water quality. In addition, 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 hurricane risk reduction alignment.

6.12.3 3% AEP Alternative

Direct, indirect, and cumulative impacts associated would be similar to those of the 1% AEP Alternative.

6.13 Hazardous, Toxic, and Radioactive Waste (HTRW)

6.13.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

An HTRW investigation has revealed evidence of existing or potential RECs that may have adversely impacted environmental conditions in the project area. The No Action Alternative is not anticipated to affect or contribute to HTRW in the area.

6.13.2 ACTION ALTERNATIVES

Consistent with ER 1165-2-132, an HTRW investigation that included site visits of the project area was conducted, excluding the Lockport to Larose Ridge and the Larose Section C-North Variant reaches. The investigation identified existing or potential RECs in and near the project area, but it is unlikely that HTRW would alter the project design or alignment, adversely affect the project area, personnel working on the project, or the public at large. If the project location or methods change, an additional HTRW investigation may be needed. Should HTRW concerns arise at anytime during the project, CEMVN would coordinate with the appropriate Federal and state authorities to implement an approved response action. The removal of HTRW is a responsibility of the Non-Federal Sponsor, by virtue of the Project Partnership Agreement (PPA).

A Phase 1 Environmental Site Assessment (ESA) was completed in the area of the Lockport to Larose Ridge and the Larose Section C-North Variant reaches in 2010. However, because no site visit was conducted, the assessment did not fully comply with ASTME 1527-05 standards. The assessment found that some of the area is heavily industrialized and includes numerous businesses that are considered Small Quantity Generators and a few Large Quantity Generators. However, none of these sites have any recorded spills or discharges that would affect the proposed project. Numerous small discharges, mainly of diesel fuel, were recorded in the Emergency Response Notification System (ERNS), but none of these were of a magnitude that would affect the project area in a significant way. Based upon this limited investigation, there do not appear to be any Recognized Environmental Conditions (RECs) in or near the two eastern reaches that would affect the project, construction personnel working on the project, the public, or the natural environment within the project area. However, a site visit was not made for this programmatic feature. Therefore, before right of entry for construction is requested a fully compliant Phase I Environmental Site Assessment would need to be completed within six months of the start of construction. This updated phase I and site visit would occur during investigation of the supplemental NEPA document for this reach.

6.14 Socioeconomics

6.14.1 POPULATION AND HOUSING

No Action Alternative (Future Without Project Conditions)

The No Action Alternative would not provide risk reduction to the residents living within the study area. A catastrophic flood would result in severe negative impacts to residents and cause significant damage to residential structures. Additionally, residents in these communities would not be able to benefit from discounted flood insurance premiums offered by the National Flood Insurance Program (NFIP) should the flood insurance rate maps (FIRMs) be updated to reflect increases in flood risk over time due to sea level rise. There would be no direct impact resulting in the displacement of population or housing under this alternative. However, since this alternative fails to provide risk reduction to the residents living within the study area, the actual and perceived risks to population under this alternative would be higher than under the proposed alternative. Indirect impacts under the No Action Alternative include a higher potential for permanent displacement of population and housing as compared to the proposed alternative as residents relocate to areas with higher levels of flood protection. Cumulative impacts under the No Action Alternative include the potential for a constriction in population/housing growth as compared to the proposed action as residents move to areas with lower flood risks.

1% AEP Alternative

Direct Impacts. Direct impacts of the Barrier Alignment through Reach L reaches to population and housing under this alternative include the displacement of approximately 10 housing units which are located within the project footprint. The Lockport to Larose Ridge Reach is located in an unpopulated area; therefore, direct impacts to population and housing are not expected. Construction of the Larose Section C-North Variant Reach would displace some residents because it is in a developed area. A more detailed examination of impacts would be conducted in a future NEPA document before construction would occur.

<u>Indirect and Cumulative Impacts.</u> Indirect impacts include increased protection from flooding for residents and residential structures in the study area for 1% (and more frequent) ACE events (100-year). Additionally, residents in these communities may benefit from discounted flood insurance premiums offered by the NFIP should the FIRMs be updated to reflect changes in the delineation of Special Flood Hazard Zones showing lower overall flood risk. Positive cumulative impacts to population and housing associated with providing risk reduction for 1% (and more frequent) ACE events may occur. The lower flood risk that would accrue to the study area under the 1% AEP Alternative may enhance the desirability of living within the protected areas which may manifest itself in in-migration to the study area.

Additionally, construction of the project has the potential to raise water levels outside the levees by several feet during storm events. These areas include portions of the communities of Gibson, Bayou Dularge, Dulac, and Cocodrie. For reasons discussed in the PAC report, the USACE has assumed the worst case compensation scenario, a 100% buy-out of all of the structures outside of the project alignment (including 876 residential structures). Should this scenario prove to be the appropriate mitigation method (again, see the PAC report for details), approximately 2,500 people would need to be relocated to areas behind the Federal protection system. Additional residential structures may need to be bought out and additional residents may need to be relocated as a result of construction of the Larose Section C-North Variant Reach.

3% AEP Alternative

<u>Direct, Indirect, Cumulative Impacts.</u> Direct impacts to population and housing under this alternative include the displacement of approximately 7 housing units which are located within the project footprint. Indirect impacts include increased protection from flooding for residents and residential structures in the study area for 3% (and more frequent) AEP events (35-year). However, under this alternative flood protection in the study area would not be provided to the 1% AEP event and therefore residents would not qualify from discounted flood insurance premiums offered by the NFIP (unless the FIRMs are updated to reflect a reduction in the area classified as Special Flood Hazard Zone). Positive cumulative impacts to population and housing associated with providing risk reduction for 3% events may occur. The lower flood risk anticipated in the study area under the 3% AEP Alternative may enhance the desirability of living within the protected areas which may manifest itself in in-migration to the study area.

Additionally, construction of the project has the potential to raise water levels outside the levees by several feet during storm events. These areas include portions of the communities of Gibson, Bayou Dularge, Dulac, and Cocodrie. For reasons discussed in the PAC report, the USACE has assumed the worst case compensation scenario, a 100% buy-out of all of the structures outside of the project alignment (including 876 residential structures). Should this scenario prove to be the appropriate mitigation method (again, see the PAC report for details), approximately 2,500 people would need to be relocated to areas behind the federal protection system.

6.14.2 EMPLOYMENT, BUSINESSES, AND INDUSTRIAL ACTIVITY

No Action Alternative

Direct, Indirect, Cumulative Impacts. The No Action Alternative would not provide risk reduction for businesses and industry in the study area. There would be no direct impacts to employment, businesses, and industrial activity under the No Action Alternative. However, since this alternative fails to provide reduced flood risk in the study area, the actual and perceived risks to employment, businesses, and industrial activity under this alternative would be higher than under the proposed alternative. Indirect impacts under the No Action Alternative include a higher potential for businesses to relocate outside of the study area as compared to the proposed alternative. Cumulative impacts under the No Action Alternative include the potential for a steady decline in employment opportunities as businesses relocate to areas with lower flood risks. The oil and gas industry, energy sector, fisheries, and agriculture would all continue to be at a higher risk for major disruption during flood events under this alternative as compared to the two project alternatives.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there may be direct, temporary impacts to businesses within proximity to the project footprint due to delays caused by increased vehicular traffic congestion. Additionally, businesses and industries that rely on navigable channels (e.g., the GIWW, the HNC, and Bayou Lafourche) for transport of goods could also experience delays during construction of floodgates and lock structures. There is also expected to be a direct, temporary increase in employment as a result of construction activity. Indirect impacts under this alternative include increased protection from flooding for businesses and industries within the study area. Positive cumulative impacts to employment, businesses, and industrial activity associated with providing risk reduction for 1% (and more frequent) ACE events may occur. The lower flood risk that would accrue to the study area under the 1% AEP Alternative may spur additional economic growth in the region than would otherwise occur. As a result, an increase in the number of firms and the output of business and industry may manifest itself in such growth.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), 114 commercial warehouses, four professional facilities, a retail store, grocery store, and a restaurant would need to be relocated to the protected side of the project. The warehouses and businesses would have the same functions as in the previous locations and would still have use of the local waterways as transfer points for goods and services. The worst-case scenario analysis did not include the Lockport to Larose or the Larose Section C-North Variant reaches. These two reaches may require additional relocations of warehouses and businesses. A more detailed examination of impacts would be conducted in a future NEPA document before construction would occur.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there may be direct, temporary impacts to area businesses due to delays caused by increased traffic congestion. Additionally, businesses and industries that rely on navigable channels (e.g., the GIWW, the HNC, and Bayou Lafourche) for transport of goods could also experience delays during construction of floodgates and lock structures. There is also expected to be a direct, temporary increase in employment as a result of construction activity. Indirect impacts under this alternative include increased protection from flooding for businesses and industry within the study area. Positive cumulative impacts to employment, businesses, and industrial activity associated with providing risk reduction for 3% (and more frequent) ACE events may occur. The lower flood risk that would accrue to the study area under the 3% AEP Alternative may spur additional economic growth in the region than would otherwise occur. As a result, an increase in the number of firms and the output of business and industry may manifest itself in such growth.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), 114 commercial warehouses, four professional facilities, a retail store, grocery store, and a restaurant would need to be relocated to the protected side of the project. The warehouses and businesses would have the same functions as in the previous locations and would still have use of the local waterways as transfer points for goods and services.

6.14.3 PUBLIC FACILITIES AND SERVICES

No Action Alternative

Direct, Indirect, Cumulative Impacts. The No Action Alternative would not provide risk reduction for public facilities in the study area. There would be no direct impact to public facilities under this alternative. However, since this alternative fails to provide reduced flood risk in the study area, the actual and perceived risks to public facilities under this alternative would be higher than under the proposed alternative. Indirect impacts under the No Action Alternative include a higher potential for disruption to public facilities and services within the study area as compared to the proposed alternative. Cumulative impacts under this alternative include the continued costs associated with protecting and maintaining public facilities during and after flood events.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there may be temporary, construction-related impacts to public facilities in the immediate vicinity of the project areas. Indirect impacts under this alternative include increased protection from flooding for public facilities in the study area. Cumulative impacts associated with the completion of the 1% AEP Alternative may occur. The lower flood risk that would accrue to the study area under this alternative may enhance the desirability of living within the study area. As a result, in-migration to the area may occur which could increase the demand for public facilities and services.

Additionally, 14 public facilities, including the Lower Bayou du Large School, are located outside of the project alignment and, should the worst-case scenario prove to be the appropriate mitigation method, would need to be relocated to the protected side of the project. The worst-case scenario analysis did not include the Lockport to Larose or the Larose Section C-North Variant reaches. These two reaches may require additional relocations of public facilities. A more detailed examination of impacts would be conducted in a future NEPA document before construction would occur.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there may be temporary, construction-related impacts to public facilities in the immediate vicinity of the project areas. Indirect impacts under this alternative include increased protection from flooding for public facilities in the study area. Cumulative impacts associated with the completion of the 1% AEP Alternative may occur. The lower flood risk that would accrue to the study area under this alternative may enhance the desirability of living within the study area. As a result, in-migration to the area may occur which could increase the demand for public facilities and services.

Additionally, 14 public facilities, including the Lower Bayou du Large School, are located outside of the project alignment and, should the worst-case scenario prove to be the appropriate mitigation method, would need to be relocated to the protected side of the project.

6.14.4 TRANSPORTATION

No Action Alternative

Direct, Indirect, Cumulative Impacts. The No Action Alternative would not provide risk reduction for the transportation infrastructure in the study area. There would be no direct impacts to transportation under this alternative. However, since this alternative fails to provide reduced flood risk in the study area, the actual and perceived risks to transportation under this alternative would be higher than under the proposed alternative. Indirect impacts under the No Action Alternative include a higher potential for flood-related damage to the transportation infrastructure within the study area. Cumulative impacts under this alternative include the continued costs associated with maintaining and rebuilding the transportation infrastructure during and after flood events.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there would be direct impacts in the form of increased vehicular congestion along roads, highways, and streets leading to the construction site as well as disruptions to navigation during construction of floodgates and lock structures. These impacts are expected to be moderate but temporary, lasting only as long as construction activities. Indirect impacts include moderate to severe degradation of the transportation infrastructure, primarily local roads and highways, as a result of wear and tear from transporting construction materials. Cumulative impacts associated with the completion of the 1% AEP Alternative may occur. The lower flood risk that would accrue to the area under this alternative may enhance the desirability of living within the protected areas. As a result, in-migration to the area may occur which would increase vehicular traffic in the area. This could increase traffic congestion and may require rehabilitation to the transportation infrastructure in the study area sooner than would normally be expected. Please see section 3.5.3 Risk and Uncertainty for a discussion of the uncertainties in the indirect and cumulative impact analysis.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (again, see the PAC report for details), there would be less usage of the vehicular transportation infrastructure outside of the project alignment. As a result, utilization and maintenance requirements of the portions of Highways 315 and 56 outside of the alignment, as well as smaller highways and local streets located outside the project boundaries, may be reduced.

If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design was also safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, there would be direct impacts in the form of increased vehicular congestion along roads, highways, and streets leading to the construction site as well as disruptions to navigation during construction of floodgates and lock structures. These impacts are expected to be moderate but temporary, lasting only as long as construction activities. Indirect impacts include moderate to severe degradation of the transportation infrastructure, primarily local roads and highways, as a result of wear and tear from transporting construction materials. Cumulative impacts associated with the completion of the 3% AEP Alternative may occur. The lower flood risk that would accrue to the area under this alternative may enhance the desirability of living within the protected areas. As a result, in-migration to the area may occur which would increase vehicular traffic in the area. This could increase traffic congestion and may require rehabilitation to the transportation infrastructure in the study area sooner than would normally be expected.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (again, see the PAC report for details), there would be less usage of the vehicular transportation infrastructure outside of the project alignment. As a result, utilization and maintenance requirements of the portions of Highways 315 and 56 outside of the alignment, as well as smaller highways and local streets located outside the project boundaries, may be reduced.

6.14.5 COMMUNITY AND REGIONAL GROWTH

No Action Alternative

Direct, Indirect, Cumulative Impacts. Under the No Action Alternative, risk reduction would not be provided for the study area and the storm surge risk reduction system would not allow many properties in these communities to benefit from discounted flood insurance premiums offered by the NFIP (should the FIRMs be updated to reflect changes in the delineation of Special Flood Hazard Zones showing lower overall flood risk). There would be no direct impacts to community and regional growth under this alternative. Indirect impacts under the No Action Alternative include a higher potential for less community and regional growth compared to the proposed alternative as residents and businesses relocate to areas with lower flood risks. Cumulative impacts under this alternative include a steady decline in the economic vitality of the study area as residents and businesses relocate to other areas due to the lack of enhanced flood protection in the area.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. This alternative would reduce flooding for communities in the study area for 1% (and more frequent) ACE events (100-year). Without strong storm and flood protection, a community's sustainability and opportunity for growth would necessarily be limited. Although improvements to flood and hurricane protection would not fully eliminate the threat of storm damages in the future, by providing risk reduction, confidence and investment in the study area would increase. Since this alternative would provide the most reliable flood risk reduction, it would most likely have the greatest effect in enhancing community sustainability and preserving growth opportunities. This alternative would have no direct or indirect adverse effect on community and regional growth. Increased protection from flooding would preserve the opportunity for community and regional growth. Cumulative impacts associated with the completion of the 1% AEP Alternative may occur. The lower flood risk that would accrue to the area under this alternative may have the effect of spurring additional economic growth in the region than would otherwise occur. In addition, the lower incidence of flooding that this alternative is designed to achieve would reduce the propensity for disruption of community life.
Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and businesses located outside of the project alignment would be relocated to areas behind the federal protection system. To the extent that these communities re-establish community ties behind the federal protection system, the opportunity for community growth would be preserved as a result of the increased protection from flooding. Regional growth is not expected to be impacted under this scenario.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. This alternative would reduce flooding for communities in the study area for 3% (and more frequent) ACE events (35-year). This alternative would have no direct or indirect adverse effect on community and regional growth. Increased protection from flooding would preserve the opportunity for community and regional growth. Cumulative impacts associated with the completion of the 3% AEP Alternative may occur. The lower flood risk that would accrue to the area under this alternative may have the effect of spurring additional economic growth in the region than would otherwise occur. In addition, the lower incidence of flooding that this alternative is designed to achieve would reduce the propensity for disruption of community life.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and businesses located outside of the project alignment would be relocated to areas behind the federal protection system. To the extent that these communities re-establish community ties behind the federal protection system, the opportunity for community growth would be preserved as a result of the increased protection from flooding. Regional growth is not expected to be impacted under this scenario.

6.14.6 TAX REVENUES AND PROPERTY VALUES

No Action Alternative

Direct, Indirect, Cumulative Impacts. Under the No Action Alternative, risk reduction would not be provided for the study area and the storm surge risk reduction system would not allow many properties in these communities to benefit from discounted flood insurance premiums offered by the NFIP (should the FIRMs be updated to reflect changes in the delineation of Special Flood Hazard Zones showing lower overall flood risk). There would be no direct impacts to tax revenues and property values under this alternative. Indirect impacts under the No Action Alternative include a higher potential for a reduction in tax revenue to communities as property values decline due to the high flood risk as well as the potential loss of residents and businesses to areas with less risk of flooding. Cumulative impacts under the No Action Alternative include the potential for a steady decline in the economic vitality of the study area as residents and businesses relocate to other areas due to the lack of enhanced flood protection in the area.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, property values near the construction site itself may decrease temporarily due to the added traffic congestion and construction noise and dust. The impact, however, would be temporary, lasting only as long as the construction. Indirect impacts under the proposed alternative may include an increase in tax revenue and property values due to the increased protection from flooding for residential properties and businesses in the study area. Positive cumulative impacts to tax revenues and property values under the proposed alternative may occur. The lower flood risk that would accrue to the study area under this alternative may have the effect of spurring additional economic growth in the region than would otherwise occur. It follows that increases in tax revenues would ensue given additional economic growth. In addition, the lower incidence of flooding that the 1% AEP Alternative is designed to achieve would have the effect of preserving, if not enhancing, property values within the protected areas.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and businesses located outside of the project alignment would be relocated to areas behind the federal protection system. Tax revenues would be expected to shift to the new locations. Property values for the owners relocated to the protected side would be expected to experience the same potential growth as a result of increased protection from flooding as those for property owners currently within the boundaries of the proposed alternative.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under this alternative, property values near the construction site itself may decrease temporarily due to the added traffic congestion and construction noise and dust. The impact, however, would be temporary, lasting only as long as the construction. Indirect impacts under the proposed alternative may include an increase in tax revenue and property values due to the increased protection from flooding for residential properties and businesses in the study area. Positive cumulative impacts to tax revenues and property values under the proposed alternative may occur. The lower flood risk that would accrue to the study area under this alternative may have the effect of spurring additional economic growth in the region than would otherwise occur. It follows that increases in tax revenues would ensue given additional economic growth. In addition, the lower incidence of flooding that the 3% AEP Alternative is designed to achieve would have the effect of preserving, if not enhancing, property values within the protected areas.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and businesses located outside of the project alignment would be relocated to areas behind the Federal protection system. Tax revenues would be expected to shift to the new locations. Property values for the owners relocated to the protected side would be expected to experience the same potential growth as a result of increased protection from flooding as those for property owners currently within the boundaries of the proposed alternative.

6.14.7 COMMUNITY COHESION

No Action Alternative

Direct, Indirect, Cumulative Impacts. Under the No Action Alternative, risk reduction would not be provided for the study area. There would be no direct impacts to community cohesion under this alternative. Indirect impacts under the No Action Alternative include a higher potential for a reduction in community cohesion if the civic infrastructure within the study area is damaged as a result of flood events. In addition, community cohesion within the study area may also be reduced if residents relocate to areas with less risk of flooding. Cumulative impacts under the No Action Alternative include the potential for a steady decline in the community cohesion of the study area as residents relocate to other areas due to the lack of enhanced flood protection in the area.

1% AEP Alternative

Direct, Indirect, Cumulative Impacts. Storm surge protection measures are designed to protect the community from the catastrophic effects of flooding, preserving the physical integrity of the developed landscape that promotes patterns of social interchange. No direct, indirect, or cumulative adverse effects on community cohesion in the study area are expected as a result of this alternative. Indirect impacts may include an increase in community cohesion due to the increased protection from flooding for the residents and civic infrastructure in the study area. Positive cumulative impacts to community cohesion under the proposed alternative may occur as the lower incidence of flooding allows communities to focus more on community-building activities rather than preparing for and recovering from flood events.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and social institutions located outside of the project alignment would be relocated to areas behind the Federal protection system. To the extent that these communities re-establish community ties behind the federal protection system, the opportunity for community cohesion would be preserved as a result of the increased protection from flooding.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Storm surge protection measures are designed to protect the community from the catastrophic effects of flooding, preserving the physical integrity of the developed landscape that promotes patterns of social interchange. No direct, indirect, or cumulative adverse effects on community cohesion in the study area are expected as a result of this alternative. Indirect impacts may include an increase in community cohesion due to the increased protection from flooding for the residents and civic infrastructure in the study area. Positive cumulative impacts to community cohesion under the proposed alternative may occur as the lower incidence of flooding allows communities to focus more on community-building activities rather than preparing for and recovering from flood events.

Additionally, should the worst-case scenario prove to be the appropriate mitigation method (see the PAC report for details), all residents and social institutions located outside of the project alignment would be relocated to areas behind the Federal protection system. To the extent that these communities re-establish community ties behind the federal protection system, the opportunity for community cohesion would be preserved as a result of the increased protection from flooding.

6.14.8 ENVIRONMENTAL JUSTICE

No Action Alternative

Direct, Indirect, Cumulative Impacts. The No Action Alternative would not provide risk reduction to the residents living within the study area. There would be no direct impact on minority and/or low-income population groups under this alternative. However, since this alternative fails to provide flood risk reduction, the actual and perceived risks to minority and/or low-income population groups under this alternative would be higher than under the alternatives. Under the No Action Alternative, Isle de Jean Charles and other communities outside the proposed levee alignment would continue to experience flooding during storm events and would be at risk in the future to increased sea level rise and subsidence. Present day surges of 7 to 10 ft could increase by as much as 3 to 7 ft more than the sea level rise increase in the future. For more information on future without project conditions regarding storm surge and sea level rise, see Section 3 of the Post Authorization Change (PAC) study.

Indirect impacts under the No Action Alternative include a higher potential for permanent displacement of minority and/or low-income population groups as compared to the proposed alternative as residents relocate to areas with higher levels of flood protection. Cumulative impacts under the No Action Alternative include the potential for a steady decline in minority and/or low-income population groups as residents move to areas with lower flood risks as well as continued financial and emotional strain placed on these groups as they prepare for and recover from flood events.

1% AEP Alternative

<u>Direct, Indirect, Cumulative Impacts.</u> Under the 1% AEP Alternative, minority and/or low-income population groups residing or working near the construction site itself may experience direct impacts due to the added traffic congestion and construction noise and dust. However, the impacts would be temporary, lasting only as long as the construction and residents are expected to be similarly impacted. Indirect impacts under this alternative include an increase in protection from 1% (and more frequent) flood events for minority and/or low-income populations in the study area. Positive cumulative impacts to minority and/or low-income populations associated with providing risk reduction are expected to occur as a result of the lower flood risk that would accrue to the area under this alternative. If the 1% AEP Alternative encourages regional economic growth, any additional jobs created may benefit minority and/or low-income groups living within the project area.

The community of Dulac is bisected by the constructible features of the proposed alignment. The constructible feature cuts through one census block in Dulac which is comprised of a minority population of 56%. The constructible features would not result in induced flooding to the community of Dulac or other communities located outside of the proposed levee alignment. Residents of Dulac would be consulted at the time of Planning and Engineering Design (PED) to determine effective methods for minimizing construction related impacts and other potential impacts to the community.

Analysis of the 2010 U.S. Census Block and the 2007-2011 ACS data indicates that 73 census blocks are located within 0.25 miles of the proposed 98-mile alignment ROW and residents could be affected by dust, noise and other construction-related activities. Approximately 32% of the residents living in the 73 census blocks are minority. Approximately 28% of the residents of the reference study areas of Lafourche and Terrebonne Parishes are minority. Construction related activities associated with the alignment are temporary in nature and would not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of E.O. 12898.

An indirect impact of the construction of the project is the potential to raise water levels outside the levees by several feet during storm events causing induced flooding to several communities located outside of the proposed levee alignment. These areas include portions of the communities of Gibson, Bayou Dularge, Dulac, and all of Cocodrie and Isle de Jean Charles. These areas would also be flooded without the project in place but not to the same extent. For reasons discussed in the PAC report, the USACE has assumed the worst-case compensation scenario for impacted communities outside of the project alignment. Should this scenario prove to be the appropriate mitigation method, at least 2,500 people would need to be relocated to areas behind the Federal protection system. Under the 1% AEP Alternative, impacts to these communities would be mitigated through 100% buy-out and uniform relocation assistance. This type of assistance may not be available to these communities under the No Action Alternative. For more information regarding the buyout and uniform relocation assistance please refer to the Real Estate Plan.

As this is a Programmatic Environmental Impact Statement, additional analysis and outreach to identified EJ communities would be conducted during PED and documented in supplemental NEPA reports in order to minimize any potential disproportionate impacts, and develop appropriate mitigation strategies if necessary.

3% AEP Alternative

Direct, Indirect, Cumulative Impacts. Under the 3% AEP Alternative, minority, and/or low-income population groups would be impacted similarly to the 1% plan. Although multiple communities outside the system, including the residents of Isle de Jean Charles, would be impacted by the project, impacts to these communities would be mitigated through 100% buy-out and uniform relocation assistance. This type of assistance may not be available to these communities under the No Action Alternative. For more information regarding the buyout and uniform relocation assistance please refer to the Real Estate Plan. As this is a Programmatic Environmental Impact Statement, additional analysis and outreach to identified EJ communities would be conducted during PED and documented in supplemental NEPA reports in order to minimize any potential disproportionate impacts, and develop appropriate mitigation strategies if necessary.

6.15 Cultural Resources

The proposed Morganza to the Gulf system has been subject to multiple cultural resources investigations that have examined past, existing, and proposed alignments, including the current constructible features. Not all lands of the entire current levee alignment have received field testing, but sample surveys have been conducted in order to verify probability models for the most likely locations and density of cultural resources (Brown et al. 2000, Goodwin and Associates 2010, Goodwin and Associates 2011, Goodwin and Associates 2012, Moreno et al. 2011, Roblee et al. 2000, USACE 2010). As such, strong and educated statements can be made about the nature and number of cultural resources within the lands affected and impacted by the proposed Morganza to the Gulf system.

CEMVN concluded that “the constructible features would have no impacts to cultural resources,” and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and the following eleven federally-recognized Tribes on June 15, 2012, pursuant to the 36 C.F.R. §800 regulations implementing Section 106 of the National Historic Preservation Act: 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 letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." The SHPO concurrence was coordinated with federally-recognized tribes in a letter dated March 5, 2013. An uncharacterized shell concentration identified in Reach E near Falgout Canal requires testing and evaluation. CEMVN would proceed with testing and evaluation of this locus once access is gained during PED. CEMVN would continue Section 106 consultation for the programmatic features through the identification and evaluation of historic properties as the plans for the features are refined.

6.15.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Cultural resources in the study area could be directly impacted under the No Action Alternative. Flooding due to storm events like Hurricane Rita causes erosion to land mass containing cultural resources; this impact is permanent, and its severity is based on the duration of the storm event.

Adverse indirect impacts to cultural resources in the study area under the No Action Alternative would be due to the continual incremental loss of natural ridges and already-subsided lands that hold both known and potential unknown cultural resources due to sea level rise, subsidence and erosion.

Cumulative impacts to cultural resources under the No Action Alternative would be due to the historical and future incremental loss of the natural ridges regionally and nationwide due to sea level rise, subsidence and erosion. Wetland and shoreline erosion and associated wetland fragmentation's conversion to open water may adversely affect the preservation of remaining cultural resources.

6.15.2 1% AEP ALTERNATIVE

Direct Impacts

The construction of levee system may directly negatively impact any cultural resource that lies in the footprint of the levee system or its associated borrow or mitigation areas. Site 16TR193 is located on the Barrier Alignment. Site 16TR71 is located near the transition from Reach B to Reach E. Sites 16TR26, 16TR304, and 16TR305 are located within Alternative 5 of Reach G. These sites have not been assessed for eligibility for the National Register of Historic Places (NRHP). Site 16TR261 is located on Reach H and is a scatter of prehistoric and historic artifacts that has been determined not eligible for the NRHP. Site 16TR33 is located on Reach J1. Within Reach K, site 16LF108 is a scatter of prehistoric ceramics and faunal remains, and has not been assessed for NRHP eligibility. Previously unrecorded sites may be identified in the areas of direct impacts, according to low and high probabilities of their existence. The majority of Reaches K and L are low probability areas. Reaches H, I, J-1 and J-2 include areas of high probability that are sunken land and only accessible today with difficulty. Reach G has both low and high probability areas and medium likelihood to contain undiscovered cultural resources. Reach F along the Houma Navigation Canal is primarily high probability land. Reach E is mostly low probability land, but does contain Site 16TR71 as demonstration that even low probability lands deserve some degree of consideration for cultural resources. Reach B contains some high probability sunken landforms, and is only accessible with difficulty. Reach A is primarily low probability land. The Barrier Alignment Reach is a mixture of low, medium, and high probability depending on its proximity to Black Bayou.

As part of a larger cultural resources survey effort, Goodwin and Associates, Inc. (2012) have produced a letter report summarizing the field survey of all constructible features outlined in this FRPEIS. A final cultural resources report would be available for consultation when other segments of levee reaches have been surveyed and discussed. No historic properties were identified within the constructible features area of potential effects, and no impacts to cultural resources would occur as a result of the construction discussed in this FRPEIS. An uncharacterized shell concentration identified in Reach E near Falgout Canal requires testing and evaluation. CEMVN would proceed with testing and evaluation of this locus once access is gained during PED.

The main portion of the Lockport to Larose Ridge reach extending from the GIWW towards Larose, east of Bayou Lafourche, received a cultural resource assessment level of investigation by Coastal Environments (Kelley 2009). This investigation identified areas of high and low probability for cultural resources along the proposed alignment, and found that no previously recorded cultural resources exist on the proposed alignment. Although not yet verified by cultural resources survey on the ground, the high probability areas give good indication and evidence for areas requiring future cultural resources study before levee construction occurs. The northern portion of this reach that trends west-east from Lockport, was not considered in the cultural resource assessment. This area would require cultural resources survey in the area nearest to Lockport, as this is high ground on natural levee that has high probability for past human activity and archaeological resources. Similarly, the eastern end of this section is an area of high probability as identified by Kelley (2009), and therefore the similar conditions would require that it be more closely examined with on-ground cultural resources survey.

The Larose Section C-North Variant has received cultural resources survey for much of its length. A 1986 (Poplin et al. 1986) survey found no cultural resources and recommended no further investigations as necessary, for the portion beginning on the south bank of Bayou Lafourche and following the GIWW, and from GIWW to its juncture with Reach L of the Morganza PAC Alignment. A 1981 (McIntire et al. 1981) survey identified no cultural resources along the east bank of GIWW, from the north bank of Bayou Lafourche to the beginning of the Lockport to Larose Ridge on the western side of GIWW. There are, however, numerous historic structures located in the nearby urban zone of this alignment. In addition, Site 16LF76 is recorded on the eastern edge of GIWW near the terminus of Larose Section C-North Variant, and would require closer examination to determine whether or not it would be impacted by the construction of the proposed levee system.

Potential direct positive impacts result to areas protected by the proposed hurricane and storm damage risk reduction project. Cultural resources that are less exposed to storm conditions and flooding, are more likely to be preserved.

Indirect Impacts

The enhanced hurricane and storm damage risk reduction project could improve chances to access certain cultural resources. This could result in negative indirect impacts from destructive activities such as looting.

Cumulative Impacts

Cumulative impacts to cultural resources under the proposed action may be due to similar regional and national risk reduction projects. In particular, the enhanced hurricane storm damage risk reduction project could reduce damages to cultural resources in an increased percentage of coastal low-lying areas.

6.15.3 3% AEP ALTERNATIVE

Direct

Direct impacts of the 3% Alternative would generally be similar to the 1% Alternative.

Indirect

Indirect impacts of the 3% Alternative would generally be similar to the 1% Alternative.

Cumulative

Cumulative impacts of the 3% Alternative would generally be similar to the 1% alternative.

6.16 Recreation

6.16.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Recreational resources in the entire region that would most likely be impacted under the No Action Alternative are those related to inundation from storm surges and loss of wetlands and habitat diversity as well as substantial salinity changes. Over time, land and habitat loss and associated changes in salinity levels encroaching from the southeast could begin to negatively affect both freshwater and saltwater based fishing as well as waterfowl hunting and land based recreational resources such as boat ramps and parks.

By taking no action, continued saltwater intrusion, storm surge inundation and wetland and shoreline erosion and associated wetland fragmentation and conversion to open water would likely continue in the study area with negative impacts on recreation resources. As marsh habitat decreases, areas for fish spawning decrease and ultimately the populations and diversity of fish species would diminish, which would affect recreational fishing opportunities negatively. Similarly, with less freshwater and intermediate marsh habitat, waterfowl hunting opportunities would likely decrease. Ridge habitat would also likely continue to decline, reducing opportunities for deer and other small game hunting.

Long term impacts may include loss of associated recreational support facilities such as marinas and bait shops that are the basis for most recreational use. This would result in a reduction in economic activity associated with recreation uses.

Cumulative impacts are the impacts on the environment that would result from the incremental impact of the No Action Alternative from the other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Existing and planned projects in the project vicinity include those supported by various sources including, but not limited to, the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) and the U.S. Army Corps of Engineers (USACE) Atchafalaya to Northern Terrebonne Marshes (ANTM) ecosystem restoration project. The ANTM project would supply freshwater to the project area, improve hydrologic distribution of water and provide structures that would reduce salt water intrusion, all of which are expected to have positive long-term benefits on recreational resources. Despite these other efforts, continued coastal erosion and increased levels of salinity would likely occur throughout much of the project area.

Localized beneficial impacts may include improved habitat from ANTM freshwater diversion and protection for fish and wildlife habitat during coastal storms due to the proposed water control structures. The CWPPRA West Lake Boudreaux Shoreline Protection and Marsh Creation project would provide additional nursery habitat for fish and improved food supply for waterfowl.

Other recent projects in the area had similar purposes and would similarly benefit recreation by improving fish and wildlife habitat. The Avoca Island Diversion and Land Building Project (CWPPRA Project Number TE-49) was approved in 2003 to divert freshwater, sediment, and nutrients from Bayou Shaffer to rebuild eroded wetlands of the Avoca Lake area. The Avoca Island Marsh Restoration project funded through The North American Wetlands Conservation Act was scheduled to begin in summer 2005 to restore coastal marsh. The GIWW Bankline Restoration Project was approved for funding through the Natural Resources Conservation Service in 2003 to protect wetland habitat and protect emerging freshwater floating marsh.

6.16.2 1% AEP ALTERNATIVE

Direct Impacts

There would be no direct impacts to recreational facilities, such as boat launches and marinas, as the proposed levee alignment avoids these features. Direct impacts to recreational fishing and hunting could occur in the work zone as construction disturbs marshes and open water increasing turbidity and temporarily causing recreational species to shift away from these areas. The proposed levee alignment includes permanently converting marsh habitat, open water habitat, and active oyster leases to uplands and project features. However, long-term, direct impacts to fishing and hunting are expected to be minimal as fish and wildlife resources would relocate once construction activities begin.

An expanded levee system would have both beneficial and detrimental effects to recreation areas and to recreational opportunities. Constructing levees would benefit recreation areas by providing additional protection to the structures and utility systems at recreational areas, which would decrease the amount of time that the areas cannot be used following severe storms. Following Hurricane Katrina, many recreational areas were used for several months for temporary housing. Additional levees would also be beneficial to recreation by providing new recreational opportunities such as the development of walking trails along the levees that may connect with existing trails.

Detrimental effects to recreation mostly relate to access to fishing areas via smaller canals, bayous, and waterways that may be both temporarily and permanently impacted by construction of the proposed levee system. The floodgates and lock would remain open most of the time, closing only in times of storms and high tides. Construction of these facilities would impact boat passage through the canals and bayous where they are placed. However, these impacts would be short term and occur during construction. Smaller access canals may no longer be available for use to gain entry to fishing areas and fisherman may have to travel alternative routes to gain access. Once the levee is in place, boaters using boat launches or coming from the camps along a section of Bayou Petite Caillou would have to travel longer distances to gain access to fishing and hunting areas east of the levee alignment--to Bush or Placid canals. Floodgates and other structure features would allow for recreational boating egress and ingress through larger canals and bayous. When the floodgates and lock are open, there would be no impact to users, however when these facilities are closed, users would be contained within the levee system.

The proposed levee alignment passes through the northwest corner of the Mandalay NWR, in particular, across the Sunrise Canal, while not impacting any facilities. The Point-Aux-Chenes Wildlife Management Area (WMA) would be directly impacted by the action. The proposed levee dissects the WMA reducing the amount of contiguous hunting acres. However, hunting which currently takes place on the land where the new levees would be constructed would transfer to adjacent areas with minimal apparent losses to the overall hunting experience. The levees would provide a linear walking path for hunters and sightseers within the perimeter of the WMA.

Indirect Impacts

Indirect impacts from project features include positive freshwater flow benefits to the vegetative and fishery communities by closing the water control structures in times of high tides, thereby restricting saltwater intrusion. Improved vegetative growth provided by way of the water control structures would benefit the marsh, which in turn would provide suitable food and cover for game species. Fisheries also benefit by improved estuarine conditions and increased food sources. The proposed floodgates, water control structures, and lock would provide similar benefits by restricting saltwater flow when necessary.

Indirect impacts to recreational fishing and hunting could result from changes in salinity levels in the project area as a result of water control structures. The slight changes in salinities would likely have minor effects on the distribution of fish and shellfish species. Marine species assemblages and the young of species that prefer higher salinities such as brown shrimp and spotted seatrout could shift slightly Gulfward from areas freshened by water control structures. The young of species such as Gulf menhaden, blue crab, white shrimp, and red drum that commonly use low to medium salinity areas and SAV habitats and freshwater species, such as crayfish, freshwater catfish, largemouth bass, and other centrarchids could slightly benefit in areas where salinities slightly decrease from implementation of the 1% AEP Alternative. Conversely, in areas where salinities slightly increase, the young of species that prefer higher salinities could move slightly inland.

Reductions in salinity due to the project would likely have minor effects on oysters. Expected slight decreases in salinity in the marshes south of Falgout Canal would likely have little effect on oyster leases and seed grounds south of this area.

Organism access to marsh and open-water areas would be impeded by some features included in this alternative and would be enhanced by others. Features with a potentially beneficial influence on fish access include environmental control structures along Falgout Canal in Reach B (Appendix G) and along Grassy Bayou in Reach H-1 (Appendix G) and a structure just to the east of Bayou Pointe aux Chenes in Reach K (Appendix G). In some areas, the proposed levee would restrict fish access to navigable and environmental structures only. The modified operation of the lock complex would block organism movement in the HNC; however, other migration routes (e.g., Bayou Grand Caillou) would remain open. Effects of water control structures depend on the type of structure and how they are operated, and salinities and water depths upstream and downstream of the structure. Higher salinity water from storm surges can become trapped behind structures; in other cases, salinities behind structures can become fresher. Fresh and low-salinity areas behind structures and levees can have increased SAV coverage.

Reduced salinity levels would help to stabilize fresh, intermediate, and brackish marsh in and around Lake Boudreaux and the Central region, stabilizing and improving habitat for waterfowl, which in turn, would enhance waterfowl hunting opportunities. Freshwater based recreational fishing should improve and current levels of recreational saltwater fishing would possibly be maintained.

According to WVAs, the 1% AEP Alternative is expected to benefit marsh (Section 6.2 and Appendix F). Improved marsh habitats and increased SAV could benefit many juvenile fishes, shrimp, crabs, and other species by increasing food and cover. Portions of the project area that are expected to benefit from improved marsh habitat as a result of this alternative would be expected to better maintain most of its current ability to support GMFMC-managed species (such as white shrimp, brown shrimp, and red drum), as well as other estuarine-dependent species (such as spotted seatrout, gulf menhaden, striped mullet, and blue crab) that are preyed upon by other GMFMC-managed species (such as mackerels, red drum, snappers, and groupers) and highly migratory species (such as billfish and sharks). Potential increases in SAV could increase the habitat available to escape predation for juveniles of some species.

Adverse effects on marsh habitat are expected to occur in some portions of the study area. Declines in fishery productivity are expected to accelerate in these areas as a result of implementing this alternative.

Cumulative Impacts

The cumulative impacts of the 1% AEP Alternative and other planned or ongoing measures would be stabilization and potential enhancement of wetlands and marsh habitat throughout the study area. Some reduction in overall salinity levels is also anticipated. Planned and on-going measures along with 1% AEP Alternative measures would likely be beneficial to the ecosystem and to recreation resources in numerous ways as habitat for various stages in the life-cycles of fish and wildlife are stabilized, protected, improved, and expanded. Improved fish habitat would increase the numbers and variety of fish, which would be beneficial to recreational fishing. Similarly, introduction of freshwater and dredge material placement would improve vegetation and habitat for birds and wildlife and would enhance opportunities for birding, hunting, and hiking. Stabilization and enhancement of fresh and intermediate marsh should enhance waterfowl hunting.

However, the temporary effects of planned, ongoing, and proposed measures would include turbidity and associated reductions in water quality. This may result in some short-term reduction in freshwater and saltwater based recreation opportunities.

Beneficial impacts to recreational resources are expected to ultimately outweigh the negative, temporary impacts due to project construction. These projects would likely stabilize and potentially enhance recreational resources and associated economic activity well into the future.

Restoration efforts in the state through programs such as LCA and CWPPRA have improved fisheries habitat, and programs like them will likely to continue. CWPPRA has a statutory end date of 2019, but reauthorization is possible. The state is seeking other funding sources for the LCA program. These projects would contribute positive cumulative effects on fisheries in the project area. Adverse impacts to fisheries may result from the construction of levees, water control structures, and hurricane protection features by local interests to protect themselves and their property from hurricane damage and flooding. Implementation of the 1% AEP Alternative would contribute a beneficial increment to impacts from other projects and initiatives in the project area by marsh acreages to the project area.

Increased levees would be detrimental to recreation if they necessitate the destruction of cabins that are currently available for vacation rentals along waterways in State Parks. At Bayou Segnette State Park, a larger levee, depending upon the design, might also necessitate the destruction of a swimming pool because it is located near the base of the current levee. Due to their proximity to potential projects to increase the size of levees, the following parks and refuges are most likely to be affected: Bayou Sauvage, Big Branch Marsh, Bayou Teche and Lacassine National Wildlife Refuges, St. Tammany Wildlife Refuge, the Bonnet Carre Spillway, Fairview-Riverside and Fontainebleau State Parks, and the Maurepas Swamp, Pearl River, Salvador-Timken, and Point Aux Chenes Wildlife Management Areas.

Increased levees along Highway 82, which is along a natural levee or Chenier in Planning Unit 4, would also be detrimental to recreation if the projects necessitate the destruction of homes along the roadway. This would negatively affect recreation in the area because these are the homes of many guides and people who work to support recreation in the area.

Increased levees would be detrimental or more costly to recreation areas by requiring longer access roads so that the grade over the higher levees would be manageable for mobile homes and a boat trailers.

6.16.3 3% AEP ALTERNATIVE

Direct

Direct impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

Indirect

Indirect impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

Cumulative

Cumulative impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

6.17 Aesthetics

6.17.1 NO ACTION ALTERNATIVE (FUTURE WITHOUT PROJECT CONDITIONS)

Visual resources in the study area could be directly impacted under the No Action Alternative. Flooding due to storm events like Hurricane Rita reduces accessibility to the Wetland Cultural Byway (Figure 6-4); this impact is temporary and its severity is based on the duration of the storm event.

Adverse indirect impacts to visual resources in the study area under the No Action Alternative would be due to the incremental loss of wetlands and the natural ridges due to sea level rise, subsidence and erosion. Wetland and shoreline erosion and associated wetland fragmentation’s conversion to open water may adversely affect the viewsheds within the Mandalay NWR and the Pointe aux Chenes WMA, and along the Southern portions of the Wetlands Cultural Scenic Byway. Opportunities for visual use including wildlife observation, environmental interpretation, and cultural awareness would diminish if the marsh and natural ridges erode.

Cumulative impacts to visual resources under the No Action Alternative would be due to the historical and future incremental loss of wetlands and the natural ridges regionally and nationwide due to sea level rise, subsidence and erosion. Wetland and shoreline erosion and associated wetland fragmentation’s conversion to open water may adversely affect the viewsheds within significant visual resources including wildlife refuges and management areas, and scenic streams and byways. Opportunities for visual use including wildlife observation, environmental interpretation, and cultural awareness would diminish with the loss of the marsh and natural ridges.

6.17.2 1% AEP ALTERNATIVE

Direct Impacts

Visual resources in the study area may be directly adversely impacted as the result of levee construction where the levee alignment crosses the Wetlands Cultural Byway south of Chauvin. Project construction details are insufficient to determine the magnitude of impacts to this visual resource.

Indirect Impacts

Visual resources in the study area positively indirectly impacted under the proposed action would be due to an enhanced hurricane storm damage risk reduction project. In particular, the enhanced hurricane storm damage risk reduction project could reduce inaccessibility to the Wetlands Cultural Scenic Byway due to storm related flooding.

Cumulative Impacts

Cumulative impacts to visual resources under the proposed action may be due to similar regional and national risk reduction projects. In particular, the enhanced hurricane storm damage risk reduction project could reduce inaccessibility to scenic byways and other significant visual resources due to storm related flooding.

6.17.3 3% AEP ALTERNATIVE

Direct Impacts

Direct impacts of the 3% Alternative would generally be similar to the 1% Alternative.

Indirect Impacts

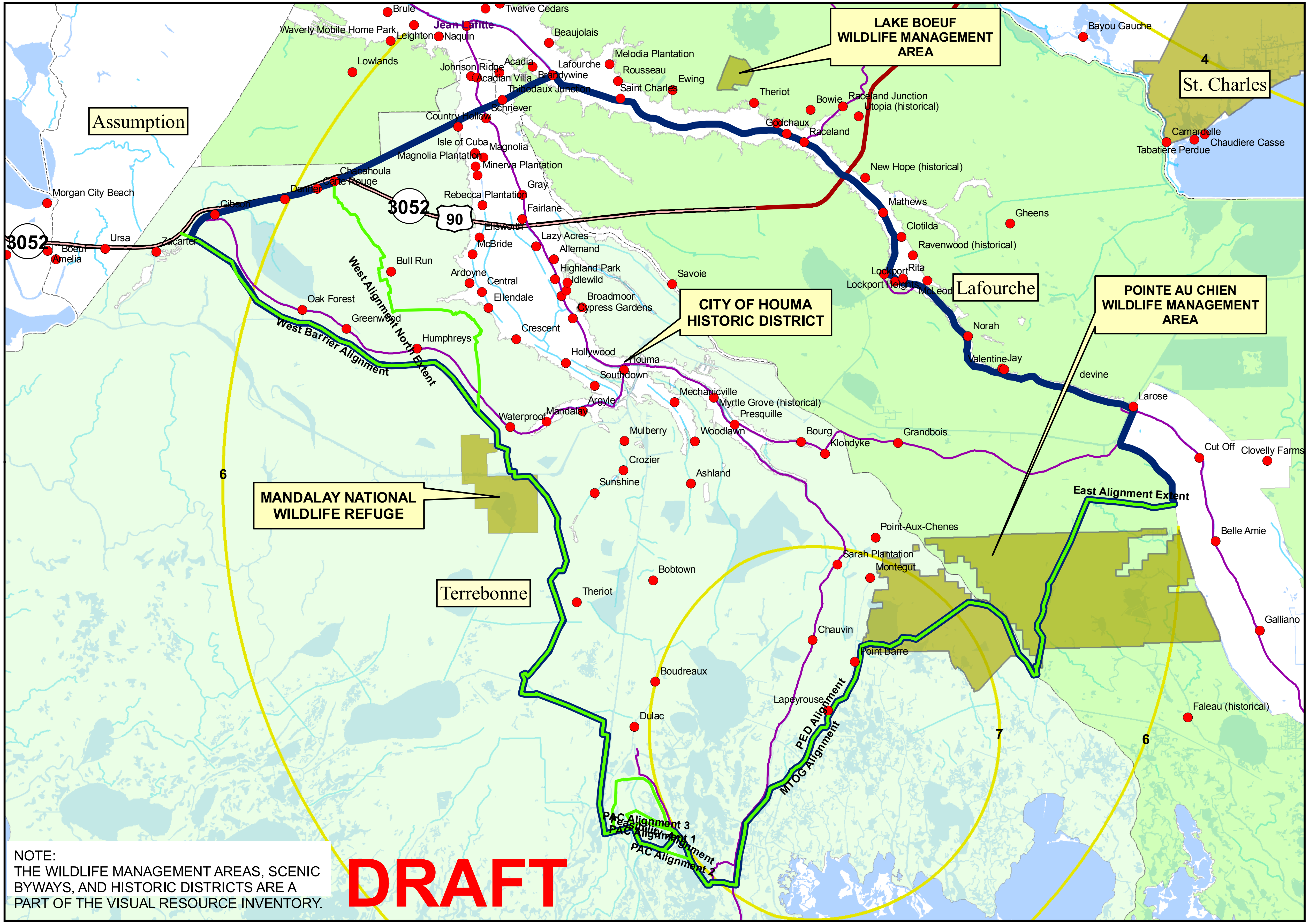
Indirect impacts of the 3% Alternative would generally be similar to the 1% Alternative.

Cumulative Impacts

Cumulative impacts of the 3% AEP Alternative would generally be similar to the 1% AEP Alternative.

U.S. ARMY CORPS OF ENGINEERS
NEW ORLEANS DISTRICT

Figure 6-4. MORGANZA TO THE GULF
FLOOD INUNDATION AND STORM SURGE - HURRICANE RITA



LAKE BOEUF WILDLIFE MANAGEMENT AREA

CITY OF HOUMA HISTORIC DISTRICT

POINTE AU CHIEN WILDLIFE MANAGEMENT AREA

MANDALAY NATIONAL WILDLIFE REFUGE

NOTE:
THE WILDLIFE MANAGEMENT AREAS, SCENIC BYWAYS, AND HISTORIC DISTRICTS ARE A PART OF THE VISUAL RESOURCE INVENTORY.

DRAFT

LEGEND

- ● Communities
- MTOG Alignments
- MTOG-Boundary
- Wetlands Cultural Byway
- Louisiana Highways
- US Highways
- Interstate Highways
- ☐ Louisiana Parishes
- ▨ USFWS National Refuges
- Hurricane Rita-Storm Surge Contours
- 🟩 Lafourche Parish-Hurricane Rita Flood Inundation
- 🟩 Terrebonne Parish-Hurricane Rita Flood Inundation

LOCATION MAP

DISCLAIMER - While the United States Army Corps of Engineers, (hereinafter referred to USACE) has made a reasonable effort to insure the accuracy of the maps and associated data, its should be explicitly noted that USACE makes no warranty, representation or guaranty, either express or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. The USACE, its officers, agents, employees, or servants shall assume no liability of any nature for any errors, omissions, or inaccuracies in the information provided regardless of how caused. The USACE, its officers, agents, employees or servants shall assume no liability for any decisions made or actions taken or not taken by the user of the maps and associated data in reliance upon any information or data furnished here. By using these maps and associated data the user does so entirely at their own risk and explicitly acknowledges that he/she is aware of and agrees to be bound by this disclaimer and agrees not to present any claim or demand of any nature against the USACE, its officers, agents, employees or servants in any forum whatsoever for any damages of any nature whatsoever that may result from or may be caused in any way by the use of the maps and associated data.

Feet
0 10,000 20,000 40,000 60,000

N W E S

December, 2011

6.18 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).

In addition to the cumulative impacts previously addressed for each significant resource, the following evaluation focuses on potential cumulative impacts of significant environmental resources.

6.18.1 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). In addition to this "significance" criterion, only those resources expected to be directly or indirectly affected by the Action Alternatives (the 1% and 3% AEP alternatives) as well as by other actions within the same geographic scope and time frame were chosen for the analysis. Based on these criteria, the following resources were identified as target resources for the cumulative effects analysis:

- Wetlands
- Hydrology
- Water Quality
- Fishery Resources
- Protected Species

The temporal boundaries for the assessment were established as follows:

- Past: Starting with the Flood Control Act of 1928, when flood control projects of the Mississippi River and its tributaries were first authorized. Since that time, the Atchafalaya Basin Floodway; GIWW; Atchafalaya River; Bayous Chene, Boeuf, and Black Navigation Channel; Houma Navigation Canal; and Houma area levees and pump systems, drainage canals, and access canals have altered the hydrology of the project area.
- Present: 2015, when the construction impacts would begin
- 2035, when construction of project features is expected to be completed.
- Future: 2035 to 2085. Seventy years is considered a reasonable period of assessment given the indefinite life of the project.

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 5.0 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 6.2 to 6.17 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 6-4.

6.18.2 STUDY AREA

The study area lies at the southern end of the Terrebonne Basin, which is situated within the Barataria-Terrebonne estuary (Figure 5-1). This estuary extends from the west bank levees of the Mississippi River (north and east), to the East Guide Levee of the Atchafalaya River (west), to the Gulf of Mexico (south), and to the town of Morganza (north). Detailed descriptions of the study area and its features are located in Section 5.1, *Environmental Setting of the Study Area*.

6.18.3 PAST, PRESENT, AND REASONABLY FORSEEABLE FUTURE ACTIONS

Descriptions of past, present, and reasonably foreseeable future projects related to the study area and the proposed project are located in Section 3.11, *Related Projects.*

6.18.4 EXISTING CONDITIONS

Existing conditions for each resource are described in Section 5.0, *Affected Environment*.

6.18.5 DIRECT, INDIRECT, AND CUMULATIVE IMPACTS

Direct, indirect, and cumulative effects of the proposed action on each of the resources considered are discussed in sections 6.5 through 6.17. A summary of effects is presented in Table 6-4.

Table 6-4. Summary of Direct, Indirect, and Cumulative Effects of Key Significant Resources

Resources/ Issues	Past Actions & Their Effects	Effects of the Updated Plan	Other Present and Reasonably Foreseeable Future Actions & Their Effects	Cumulative Effects of All Actions
Wetlands	Coastal Louisiana has lost an average of 34 square miles of land, primarily marsh, per year for the last 50 years because of development, oil and gas activities, loss of sediment input, and natural subsidence.	Wetlands would be filled to construct project features. These losses would be compensated through the establishment of vegetated wetlands.	Vegetated wetlands in the study area are anticipated to be improved through LCA, CWPPRA, and other Federal, state, and local restoration programs.	When combined with LCA, CWPPRA, and other Federal, state, and local restoration efforts, the net effects would be beneficial to wetland resources of the study area.
Hydrology	Anthropogenic changes within the study area have altered the natural hydrology. Canals, pipelines, roads, railroads, navigation channels, and levees have altered the natural flow patterns. Historically, freshwater inflows within the study area were driven by the Atchafalaya River and Bayou Lafourche, whose connection with the Mississippi River was closed. Existing flows within the study area are driven by the lower Atchafalaya River. Other major channels are the GIWW, and the HNC, which has been implicated in higher salinity in the Houma area. Most of the study area is influenced by tidal movement from the Gulf of Mexico.	Minor changes in average salinity values (less than 1 ppt in most areas), minor changes in average water surface elevations (less than 0.1 ft in most areas), minimal change in tide range and discharge would occur. There would be minimum global salinity changes with the largest changes occurring in the marsh area south of Falgout Canal.	Local parish and levee districts are currently constructing interim levees and structures for hurricane and storm surge risk reduction.	It is anticipated that this project, acting in concert with other storm surge/levee projects in coastal Louisiana, would provide cumulative benefits by enhancing safety and aid in protecting the lives and property of coastal communities.
Water Quality	Shallow lakes are eutrophic with high nutrient levels; do not fully support their designated uses	Construction activities would result in localized increases in turbidity and suspended	Although proper management of tidal exchange structures can minimize changes in flow	The proposed project, combined with other coastal activities (such as those

	because of pathogen indicators. Pathogen indicators are the most frequent causes of use impairment in bayous, creeks, and canals followed by organic enrichment/ low-dissolved oxygen and nutrients. Estuarine/coastal waters experience eutrophication/ hypoxia, habitat modification, and produced water discharges. Sources include wastewater treatment plants, minor point sources, septic tanks, and inflow and infiltration, and agricultural runoff. Salinity increases resulted from expanded open waters, loss of marsh vegetation, and storms trapping salt water trapped behind levee and natural ridges. Damage may have occurred with the BP Oil Spill of 2010. Organics in elutriate samples were below detection limits. Mercury (one site) and lead (three sites) exceeded chronic LDEQ thresholds. Some metals in sediments exceeded NOAA benchmarks.	solids, at both the dredging and placement sites. It is not anticipated construction or the use of adjacent borrow for levee fill would have significant impacts. Levee construction would convert wetlands, which benefit water quality, to uplands. The 1% PLAN would restrict the entry of salt water into interior water bodies as SLR occurs.	and water level between the flood and protected side of the proposed levee alignment, the proposed alignment may alter the study area by inhibiting water exchange between the protected and flood sides of the proposed levee and result in stagnation. The potential exists for expansion of developed areas, which could degrade water quality on the protected side of the propose alignment.	included in the discussion of future without project conditions) would cumulatively impact study area water quality. In addition, 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 hurricane risk reduction alignment.
Fishery Resources	The study area contains a variety of aquatic habitats, including ponds, lakes, bayous, canals, shallow open water areas, and bays. Commercial fisheries resources are important to the	No direct impacts on fishery species would result from the 1% PLAN. Minimal indirect impacts on fishery resources due to changes in fishery access, salinity, turbidity, and	Aquatic habitats in the study area are anticipated to be improved through LCA, CWPPRA, and other Federal, state, and local restoration programs.	When combined with LCA, CWPPRA, and other Federal, state, and local restoration efforts, the net effects associated with the 1% PLAN would benefit fishery

	study area, with landings at the ports at Dulac-Chauvin and Golden Meadow-Leeville. Salinity and submerged vegetation affect the distribution of fish and invertebrates in coastal marshes. The most abundant species collected in freshwater and intermediate marsh areas adjacent to the project area were residents predominantly associated with submerged aquatic vegetation. Important freshwater species include largemouth bass, yellow bass, crappie, bluegill and other sunfishes, and catfishes. Marshes in the area support commercially and recreationally important marine fish and shellfish species including red and black drum, sheepshead, mullet, flounder snappers, seatrout, white shrimp, brown shrimp, blue crab, eastern oyster, and Gulf stone crab. The most abundant marine transient species collected near the project area included menhaden, blue crab, bay anchovy, and mullet.	SAV. The 1% PLAN would partially offset the loss of aquatic habitats thereby benefiting fishery species dependant on these habitats.		resources of the study area.
Threatened and Endangered Species	The piping plover, the Gulf sturgeon, and Kemp's ridley sea turtle may occur in or near the study area. The bald eagle and the brown pelican, previously listed, but both species were removed	No direct impacts on threatened or endangered species would result from the 1% PLAN. The 1% PLAN would partially offset the loss of coastal habitats thereby	The incremental effects of the proposed project would contribute to beneficial effects associated with other coastal projects, including LCA, CWPPRA, and other	The overall cumulative effects of these projects would be the maintaining of coastal habitats along a greater portion of the Louisiana coastline, thereby

Resources/ Issues	Past Actions & Their Effects	Effects of the Updated Plan	Other Present and Reasonably Foreseeable Future Actions & Their Effects	Cumulative Effects of All Actions
	from the Federal list of threatened and endangered species.	benefiting threatened and endangered species dependant on these habitats.	Federal, state, and local restoration programs.	reducing any adverse effects of local disturbances on threatened or endangered species.

6.19 Mitigation

6.19.1 INTRODUCTION

Laws, regulations, and USACE policy ensure that adverse impacts to significant resources have been avoided or minimized to the extent practicable and that remaining, unavoidable impacts have been compensated to the extent justified. The appropriate application of mitigation is to formulate an alternative that first avoids, then minimizes, and lastly, compensates for unavoidable adverse impacts. This section, in conjunction with Appendix K, serves as the mitigation plan required by 33 CFR 332.4(c) and 40 CFR 230.92.4(c).

6.19.2 WATER QUALITY

Contracted construction companies would be required to follow standard best management practices (BMPs) to minimize the introduction of suspended solids into surrounding waters. These BMPs include such practices as the use of siltation fences and hay bales to reduce erosion at construction sites. Requirements to comply with BMPs would be included in and made part of construction contracts.

6.19.3 WETLAND MITIGATION

In the development of the action alternatives, features that were incorporated to avoid and minimize potential adverse environmental effects included, where practical, the placement of levees at locations that would avoid or minimize effects on wetlands or other significant features of the project area.

An interagency Habitat Evaluation Team (HET) was formed to use Wetland Value Assessment (WVA) methodology to assess the quality of wetlands of the area, make a determination of the effects various aspects of the project on future conditions, and calculate the amount of mitigation required to compensate for impacts caused by the constructible features of the project. The HET was composed of representatives from the USFWS, NMFS, USACE, USEPA, NRCS, LDWF, CPRAB, and LDNR. A description of the WVA methodology, analysis, and assumptions made by the HET may be found in Appendix F, *Wetland Value Assessment.*

6.19.4 WETLAND MITIGATION PLAN FOR CONSTRUCTIBLE FEATURES

A mitigation program (wetland mitigation plan) was developed by the USACE, in coordination with the HET, to compensate for both direct and indirect impacts to wetland habitats associated with the constructible elements of the 1% AEP alternative (the 1% AEP project). These constructible elements (constructible components; constructible features) include project levee reaches F1, F2, and G1, the HNC Lock Complex, and the Bayou Grand Caillou Floodgate. It was determined that the constructible project elements would result in direct impacts to approximately 26 acres of fresh marsh habitats, 230 acres of intermediate marsh habitats, and 414 acres of brackish marsh habitats, and indirect impacts to approximately 3,965 acres of fresh marsh habitats, 16,020 acres of intermediate marsh habitats, 12,442 acres of brackish marsh habitats, and 13,788 acres of saline marsh habitats.

Compensatory mitigation alternatives considered the purchase of mitigation credits from approved mitigation banks and USACE constructed (Corps-constructed) in-kind mitigation. The Water Resources Development Act of 2007 requires that the USACE first consider using commercial mitigation banks to provide compensation for impacts to wetlands. The USACE determined that the use of mitigation banks to compensate for the aforementioned wetland impacts was not feasible since no mitigation banks with credits for saline, brackish or intermediate marsh were located in the vicinity of the project area. Thus, the mitigation alternative selected consists of Corps-constructed projects whereby appropriate marsh habitats would be restored (created) in existing open water areas.

Appendix K contains the mitigation program proposed to compensate for unavoidable direct and indirect wetland impacts resulting from the constructible features (e.g. constructible elements of the 1% AEP project). Topics addressed in this mitigation program (plan) include:

- Mitigation objectives (including determination of mitigation credits).
- Mitigation work plan.
- Mitigation maintenance and management plan.
- Adaptive management plan.
- Land acquisition and preservation/protection of mitigation features.
- Mitigation success criteria (performance standards).
- Mitigation monitoring and reporting requirements (including estimated monitoring/reporting cost).
- Financial assurances.
- Mitigation plan drawings (Figures K1 through K4)

Baseline wetland information is provided in Section 5.2.1 and in Appendix F, *Wetland Value Assessment*.

One should note that the drawings (or “plates”) contained in Appendix G, *Mapbook*, depict conceptual boundaries of potential “mitigation areas” for the programmatic features. The mitigation areas depicted do not include the mitigation features proposed as compensation for impacts associated with the constructible project elements. Instead, these mitigation features are depicted in the mitigation plan drawings contained in Appendix K. The proposed mitigation features consist of approximately 394 acres of intermediate marsh restoration, 358 acres of brackish marsh restoration, and 883 acres of saline marsh restoration. More area then needed has been identified in the figures to allow for potential shift in the location due to unforeseen reasons such as pipelines.

The Water Resources Development Act (WRDA) of 2007, Section 2036 (a) and implementation guidance (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 adaptive management (AM) and monitoring be included in mitigation for fish and wildlife and wetland losses. As mentioned previously, the proposed mitigation monitoring and Adaptive Management is described in Appendix K.

The project authorization for the Morganza to the Gulf, Louisiana project stipulates that all costs of Operation, Maintenance, Repair, Rehabilitation and Restoration (OMRR&R) are the 100 percent responsibility of the Non-Federal Sponsor (NFS). In accordance with that statutory requirement, when the project or a portion of the project construction is complete, the USACE is required by law to provide the NFS with a notice of completion of construction (NCC) and the commencement of the period of OMRR&R.

In accordance with the project's statutory authority, the proposed mitigation actions would include construction, with the NFS responsible for operation, maintenance, repair, restoration, and rehabilitation of functional portions of work as they are completed. On a cost-shared basis, USACE would monitor completed mitigation to determine whether additional adaptive management actions are necessary to achieve mitigation success. USACE would undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved applicable initial success criteria, monitoring would be performed by the NFS as part of its OMRR&R obligations. If, after meeting the applicable initial success criteria, the mitigation fails to meet its other mitigation success criteria, USACE would consult with other agencies and the NFS to determine whether operational changes would be sufficient to achieve the success criteria. If, instead, structural changes are deemed necessary to achieve ecological success, USACE would instruct the NFS to implement appropriate adaptive management measures in accordance with the contingency plan and subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.

6.19.5 WETLAND MITIGATION PLAN FOR PROGRAMMATIC FEATURES

The programmatic elements (components) of the 1% AEP alternative (the 1% AEP project) consist of all proposed project elements except those designated as being constructible elements (e.g. all elements except for levee reaches F1, F2, and G1, the HNC Lock Complex, and the Bayou Grand Caillou Floodgate). Table 6-5 provides a preliminary estimation of the direct habitat impacts that would result from construction of the programmatic project elements.

Table 6-5. Direct habitat impacts for programmatic project elements (preliminary estimates).

Habitat	Direct Impacts(acres)
Bottomland Hardwoods	520.3
Swamp	599.3
Fresh Marsh	802.8
Intermediate Marsh	385.8
Brackish Marsh	368.9
Saline Marsh	736.2
Non-Tidal Habitats	30.6
Total Direct Impacts	**3,444.9**

It is emphasized that the data presented in Table 6-5 constitute preliminary programmatic estimates of potential direct habitat impacts. Potential adverse indirect habitat impacts are not included in this table and have yet to be fully evaluated and quantified. No WVA models have been run for the direct habitat impacts, nor have WVA models been run for potential indirect habitat impacts that may require mitigation. Design details of each of the programmatic components of the project would be refined and further assessment of direct and indirect habitat impacts associated with the programmatic project elements, including adverse habitat impacts resulting from constructing mitigation features, would be provided in one or more future supplemental NEPA documents.

Given the current uncertainties regarding direct and indirect habitat impacts, a mitigation plan to compensate for unavoidable habitat impacts associated with the programmatic project elements has not yet been generated. Based on the project design refinements and future reevaluation of potential habitat impacts mentioned, mitigation plan(s) would be developed to fully compensate for unavoidable direct and indirect habitat impacts (including wetland impacts) in accordance with the requirements of 33 CFR Part 332 and other applicable laws and policies. Mitigation requirements would be based on WVA models. Such mitigation plans, including adaptive management as necessary, would be provided in future supplemental NEPA documents; the same supplemental NEPA documents addressing the habitat impact reevaluations.

The aforementioned supplemental NEPA documents would include an evaluation of various alternatives to achieve the necessary mitigation and would set forth the preferred mitigation alternative(s) (the Tentatively Selected Plan, or mitigation TSP). Such alternatives could include, but are not necessarily limited to the following. However, preservation of existing wetlands would not be considered as potential mitigation alternative (mitigation strategy).

- Purchase of mitigation “credits” from one or more authorized mitigation banks. Under this alternative, credits purchased would have to be for “in-kind” mitigation. This basically means that the mitigation credits purchased from a bank would have to be for the same habitat type as the habitat impact being mitigated. However, three exceptions apply to the “in-kind” mitigation requirement; (1) Impacts to fresh marsh habitats can be mitigated via intermediate marsh habitats and vice versa; (2) Impacts to brackish marsh habitats can be mitigated via saline marsh habitats and vice versa; (3) Impacts to dry bottomland hardwoods (BLH-Dry) habitats can be mitigated via wet bottomland hardwoods (BLH-Wet) habitats. The exceptions whereby fresh marsh and intermediate marsh habitats are essentially considered to be equivalent habitat types, and whereby brackish marsh habitats and saline marsh habitats are considered to be equivalent habitat types are consistent with CEMVN Regulatory policies and have been approved by the HET. The exception whereby impacts to BLH-Dry habitats can be mitigated through creation, restoration, or enhancement of BLH-Wet habitats is consistent with current and past CEMVN policies pertaining to civil works projects and has been approved by USFWS and other resource agencies. Note that this same approach regarding the requirement for in-kind mitigation, including the stated exceptions, is applicable to Corps-constructed mitigation projects. Presently there are two mitigation banks in the basin (Hydrologic Unit Code) that would be considered for the programmatic features.

They may potentially provide credits for fresh marsh, Cypress/Tupelo Gum Swamp, and Bottomland Hardwoods. If new banks come online they would be considered.

- Purchase of mitigation credits from the State of Louisiana's In-Lieu Fee (ILF) mitigation program, if this program is authorized. Under this alternative, credits purchased would also have to be for in-kind mitigation as discussed above. One should note that the proposed ILF program currently has not been authorized by CEMVN Regulatory, although it seems likely that the program would be authorized by the time mitigation alternatives are evaluated.

- Corps-constructed mitigation. This alternative would involve construction of in-kind mitigation features by the USACE. The type of mitigation involved could vary depending on the habitat type being mitigated and existing conditions at the proposed mitigation site(s). Examples include, but are not necessarily limited to:

    - Restoration/creation (terms used interchangeable) of marsh habitats in existing open water areas to compensate for project marsh impacts.
    - Renourishment (enhancement) of existing degraded marsh habitats to compensate for project marsh impacts.
    - Restoration/creation of swamp habitats in existing open water areas or in substantially altered uplands (such as agricultural fields) to compensate for project swamp impacts.
    - Enhancement of existing degraded swamp habitats to compensate for project swamp impacts.
    - Restoration/creation of BLH-Wet habitats in existing open water areas or in substantially altered uplands (such as agricultural fields) to compensate for project BLH-Wet and/or BLH-Dry impacts.
    - Enhancement of existing degraded BLH-Wet habitats to compensate for project BLH-Wet and/or BLH-Dry impacts.

- A combination of two or more of the above alternatives. This approach could include the purchase of mitigation bank credits and/or ILF program credits in combination with Corps-constructed mitigation to achieve full compensation (mitigation) of impacts to a particular habitat type.

It is noted that construction of certain levee reaches and structures has already been initiated by TLCD at its own risk, and TLCD has initiated mitigation for wetland impacts associated with this construction (with authorization via permitting pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act). Because of this, the mitigation proposed for applicable reaches of the programmatic elements of the Morganza to the Gulf project would take into account the wetland mitigation already provided by TLCD for these reaches when determining wetland mitigation requirements. For information on the eligibility of the cost of the permitted TLCD mitigation to be considered for work-in-kind credit see section 1.8 of the associated PAC report. This would be addressed in the previously mentioned supplemental NEPA documents, as applicable. The reader is advised that this issue does not apply to the constructible project and thus does not affect the proposed mitigation for habitat impacts generated by these constructible features.

The drawings (or "plates") contained in Appendix G, *Mapbook*, depict conceptual boundaries of potential "mitigation areas" that could serve as mitigation for habitat impacts associated with the programmatic project elements. The reader is advised that the depicted areas are merely conceptual at this stage and do not necessarily reflect boundaries of mitigation features that may ultimately be proposed for the programmatic impacts. The locations and boundaries of proposed Corps-construction mitigation features would be developed, refined, and presented in the future supplemental NEPA documents. Such mitigation features could easily be proposed in locations not shown in the Appendix G drawings. Several "mitigation areas" shown in the Appendix G drawings encompass portions of existing marsh habitats. Regardless, the USACE does not propose to establish mitigation features where there are existing marsh habitats, with the possible exception of mitigation involving marsh renourishment should such mitigation be proposed. Corps-constructed mitigation projects would instead be located in a manner that avoids impacts to existing marsh habitats to the greatest degree practicable. Any unavoidable adverse impacts to existing marsh habitats or to other habitats would be fully compensated as part of the programmatic mitigation plans, as necessary.

One should also note that the drawings in Appendix G do not illustrate potential borrow sites that may be needed to build Corps-constructed mitigation features, other than borrow areas associated with levee system construction. While the USACE proposes to use organic overburden acquired within the levee right-of-way as fill for creating marsh restoration features where feasible, it is probable that this overburden may be insufficient to completely build such features. Additional borrow material would be obtained from other areas in such cases, likely from dredging open water areas or brought in from offsite. Additional borrow areas would be located to avoid and minimize wetland impacts to the extent practicable, as would be other areas needed for mitigation construction such as access corridors and staging areas. Any unavoidable wetland impacts would be fully compensated as part of the programmatic mitigation plans.

Mitigation Implementation Commitments

Construction of authorized Corps-constructed mitigation features necessary to fully compensate for habitat impacts, including both direct and indirect impacts, generated by a particular levee reach or group of reaches would be implemented concurrent with the construction of said levee reach(s). To the extent practicable, the initial mitigation construction activities would be completed within 18 months of the start of mitigation construction. For purposes of clarity, an example of "initial mitigation construction activities" associated with creation of marsh habitats in open water areas would include construction of containment dikes and the initial placement of all fill (borrow) material necessary to establish the marsh features. In this example, the initial construction phase (activities) would not include the time period necessary for the borrow material to settle to the final target marsh platform elevation and would not include subsequent construction activities such as degrading or gapping the containment dikes or completion of initial plantings. If the authorized mitigation involves the purchase of mitigation bank credits or state ILF credits, these credits would be purchased either in advance of the initiation of project construction or within 12 months from the start of project construction activities.

The exact sequencing and schedule for construction of the various programmatic levee reaches cannot be accurately estimated at this time. It is possible that a project phase could involve construction of one or more levee reaches that would only result in very limited direct and indirect habitat impacts. Given this scenario, implementation of any Corps-constructed compensatory mitigation required for this construction phase might be deferred until the initiation of the next levee system construction phase (construction of additional reaches) that requires a significant amount of Corps-constructed mitigation to compensate for similar habitat impacts. For example, if construction phase "A" results in impacts to only two acres of intermediate marsh habitat for which four acres of Corps-constructed mitigation is authorized and the next construction phase "B" results in impacts to twenty acres of intermediate marsh habitat for which forty acres of Corps-construction mitigation is authorized, then the mitigation for phase "A" would be deferred such that it would be implemented concurrent with and combined with the construction of intermediate marsh mitigation required for phase "B". This would allow construction of a single 44-acre intermediate marsh creation project vs. merely constructing a 4-acre intermediate marsh creation project in construction phase "A".

Should such a scenario arise, the deferred mitigation approach would first be addressed in the supplemental NEPA document applicable to the levee reaches involved and would be coordinated with the HET and NFS. The temporal lag in deferring mitigation to a subsequent project phase would be accounted for in WVA models and could therefore increase the amount of mitigation required compared to the amount needed if the mitigation was not deferred. Deferral of mitigation would only occur if approved by the HET, and the NEPA document proposing such an approach is authorized.

The following subsections address other miscellaneous aspects of the mitigation plans to be developed for the programmatic elements of the project.

- Corps-constructed marsh restoration (creation) features would be located in open water areas and would avoid impacts to existing marsh habitats and forested wetland habitats to the greatest degree practicable.

- To the extent practicable, containment (retention) dikes constructed to establish marsh restoration features would be mechanically degraded such that the elevation of the degraded dike crest is the same as the elevation of the marsh feature once the marsh platform has settled to its target grade. However, it may be necessary to create "gaps" in these dikes rather than completely degrading them. It is also possible that some dikes may be designed as armored earthen dikes or as rock dikes to help protect created marsh features. In such cases, leaving the dike crest elevation higher than the marsh platform elevation would be desirable and provision of dike gaps or "fish dips" in the dike would be necessary. General design criteria for dike gapping would include:
    - If total dike degradation is not feasible, one 25-foot gap (bottom width) approximately every 500 linear feet of dike would be provided. The depth of a gap would be dependent if it is bordered by open water or existing marsh. Gaps adjacent to open water would have a depth equivalent to the pre-project water

  depth. Gaps adjacent to pre-existing marsh would have a depth equivalent to the average marsh elevation
  - If scour aprons are included, the bottom would be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.
  - Degraded containment dike material would typically be placed either in remaining depressions within the marsh mitigation feature formed by excavation when building the dikes, or immediately adjacent to exterior side of the dike in open water areas. Degraded material would not be placed in pre-existing marshes.
  - Field adjustments in the typical spacing and dimensions of gaps would be allowed based on conditions developing in the marsh restoration feature; however, such adjustments would only be made when coordinated and approved by NFMS and the HET.

- The final target elevations for proposed marsh restoration features would be determined based upon the typical elevations of healthy marshes in the vicinity of the proposed marshes (e.g. bio-benchmark surveys). The average surface elevation of healthy marshes would be determined by surveying no less than 3 locations in the general vicinity. During the survey process, the marsh surface is reached when the survey rod is resting among living stems or is supported by soil containing living roots. In order to get a consistent reading, it may be necessary to cut vegetation stems where stem density is extremely high. A minimum of approximately 20 elevations (each separated by approximately 20 to 40 feet.) at each of the marsh sites would typically be required for this determination.

- Most mitigation projects provided for wetland/habitat impacts associated with the programmatic project elements would likely be located on the flood side of the proposed levee system; however, the possibility of some mitigation being located on the protected side of the levee system cannot be excluded at this stage. Such mitigation would likely be restricted to habitat impacts on the protected side of the levee system.

- Any proposed Corps-constructed mitigation alternatives would be designed so as to not interfere with the intended functions of Environmental Water Control Structures (water control structures) incorporated in the proposed levee system. Similarly, such mitigation alternatives (such as marsh creation features) would be located and designed to help maintain desirable surface water exchange.

- All efforts to avoid impacting Mandalay NWR lands would be considered. A special use permit would be obtained for any surveying or construction on NWR lands. If levees or other project features must be constructed on the Mandalay NWR, the USACE would coordinate with the USFWS to determine the unavoidable habitat impacts, the habitat functions/values that would be lost due to these impacts, and appropriate mitigation to ensure there would be no net loss of habitat functions/values. The USACE would strive to compensate for unavoidable impacts via mitigation within the Mandalay NWR boundaries and/or its acquisition boundaries. If this is not practicable, the USACE would strive to provide the necessary mitigation in a different NWR within the same NWR complex.

- Project impacts to the Point aux Chenes WMA would be avoided and minimized to the greatest degree practicable. USACE would coordinate with the LDWF to determine any unavoidable habitat impacts, the habitat functions/values that would be lost due to these impacts, and appropriate mitigation to ensure there would be no net loss of habitat functions/values. The USACE would strive to compensate for unavoidable impacts via mitigation within the WMA.

7. ENVIRONMENTAL REQUIREMENTS

ENVIRONMENTAL REQUIREMENTS

This chapter documents the coordination and compliance efforts regarding statutory authorities including: environmental laws, regulations, executive orders, policies, rules, and guidance. Consistency of the tentatively selected plan with other Louisiana coastal restoration efforts is also described.

Relevant Federal statutory authorities and executive orders are listed in **table 7-1**. Relevant State of Louisiana statutory authorities are listed in **table 7-2**. Full compliance with statutory authorities would be accomplished upon agency review and concurrence of resource effects and consistency determinations, upon review of the Final Environmental Impact Statement by appropriate agencies and the public, and the signing of a Record of Decision (ROD).

Table 7-1: Relevant Federal Statutory Authorities and Executive Orders
(Note: This list is not complete or exhaustive)

Abandoned Shipwreck Act of 1987
American Indian Religious Freedom Act of 1978
Anadromous Fish Conservation Act of 1965
Archaeological Resource Protection Act of 1979
Archaeological and Historical Preservation Act of 1974
Bald Eagle Protection Act of 1940
Clean Air Act of 1970
Clean Water Act of 1977
Coastal Barrier Improvement Act of 1990
Coastal Barrier Resources Act of 1982
Coastal Wetlands Planning, Protection, and Restoration Act of 1990
Coastal Zone Management Act of 1972
Coastal Zone Protection Act of 1996
Comprehensive Environmental Response, Compensation, and Liability Act of 1980
Consultation and Coordination with Indian Tribal Governments (EO 13175) of 2000
Deepwater Port Act of 1974
Emergency Planning and Community Right-to-Know Act of 1986
Emergency Wetlands Restoration Act of 1986
Endangered Species Act of 1973
Environmental Quality Improvement Act of 1970
Estuaries and Clean Waters Act of 2000
Estuary Protection Act of 1968
Estuary Restoration Act of 2000
Exotic Organisms (EO 11987) of 1977
Farmland Protection Policy Act of 1981
Federal Actions to Address Environmental Justice

Marine Mammal Protection Act of 1972
Marine Protected Areas (EO 13158) of 2000
Marine Protection, Research, and Sanctuaries Act of 1972
Migratory Bird Conservation Act of 1929
Migratory Bird Treaty Act of 1918
Migratory Bird Habit Protection (EO 13186) of 2001
National Environmental Policy Act of 1969
National Historic Preservation Act of 1966
National Invasive Species Act of 1996
Native American Graves Protection and Repatriation Act of 1990
Neotropical Migratory Bird Conservation Act of 2000
Noise Control Act of 1972
Nonindigenous Aquatic Nuisance Prevention and Control Act of 1996
North American Wetlands Conservation Act of 1989
Oil Pollution Control Act of 1990
Outer Continental Shelf Lands Act of 1953
Pollution Prevention Act of 1990
Prime or Unique Farmlands, 1980 CEQ Memorandum
Protection and Enhancement of the Cultural Environment (EO 11593) of 1971
Protection and Enhancement of Environmental Quality (EO 11991) of 1977
Protection of Children from Environmental Health Risks and Safety Issues (EO 13045) of 1997

in Minority Populations & Low-Income Populations (EO 12898, 12948) of 1994, as amended
Federal Compliance with Pollution Control Standards (EO 12088) of 1978
Federal Emergency Management (EO 12148) of 1979
Federal Water Pollution Control Act of 1972
Federal Water Project Recreation Act of 1965
Fish and Wildlife Conservation Act of 1980
Fish and Wildlife Coordination Act of 1958
Flood Control Act of 1944
Floodplain Management (EO 1988) of 1977
Food Security Act of 1985
Greening of the Government Through Leadership in Environmental Management (EO 13148) of 2000
Historic Sites Act of 1935
Historical and Archaeological Data-Preservation Act of 1974
Protection of Cultural Property (EO 12555) of 1986
Protection of Wetlands (EO 11990) of 1977
Reclamation Projects Authorization and Adjustments Act of 1992
Recreational Fisheries (EO 12962) of 1995
Resource Conservation and Recovery Act of 1976
Responsibilities of Federal Agencies to Protect Migratory Birds (EO 13186) of 2001
Rivers and Harbor Acts of 1899, 1956
Safe Drinking Water Act of 1974
Submerged Land Act of 1953
Sustainable Fisheries Act of 1996
Toxic Substances Control Act of 1976
Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646)
Water Resources Development Acts of 1976, 1986, 1990, 1992, and 2007
Water Resources Planning Act of 1965

Table 7-2: Relevant State Statutory Authorities
(Note: this list is not complete or exhaustive)

Air Control Act
Archaeological Treasury Act of 1974
Louisiana Coastal Resources Program
Louisiana Natural and Scenic Rivers System Act
Louisiana Threatened and Endangered Species and Rare & Unique Habitats
Protection of Cypress Trees
Water Control Act

CLEAN AIR ACT – AIR QUALITY DETERMINATION

Compliance with the Clean Air Act (42 U.S.C.A. §7401) has been coordinated with the Air Quality Section of the Louisiana Department of Environmental Quality (LDEQ). As required by *Louisiana Administrative Code*, Title 33 (LAC 33:III.1405 B), an air quality applicability determination has been developed for the 1% alternative. This includes consideration of the 1% alternative for the category of general conformity, in accordance with the Louisiana General Conformity, State Implementation Plan (LDEQ, 1994). By electronic mail notification on January 15, 2013, LDEQ stated that Terrebonne and Lafourche Parishes are classified as attainment with the National Ambient Air Quality Standards and have no general conformity determination obligations

CLEAN WATER ACT – SECTION 401 WATER QUALITY

Under provisions of the Clean Water Act (33 U.S.C. § 1251) of 1972, any project that involves the placement of dredge or fill material in waters of the United States or wetlands, or mechanized clearing of wetlands would require water quality certification from the LDEQ, Office of Environmental Services. An application for water quality certification describing the impacts of the proposed action to water quality as described in Section 404(b)(1) evaluation, along with a copy of the DRPEIS, has been provided to the LDEQ. LDEQ correspondence indicates “that the requirements for a Water Quality Certification (WQC) has been met… therefore, the Department hereby issues a WQC to the U.S. Army Corps of Engineers – New Orleans District.” See Appendix I

CLEAN WATER ACT – SECTION 404(B)(1)

The United States Army Corps of Engineers (USACE) is responsible for administering regulations under Section 404(b)(1) of the Clean Water Act. Potential project-related impacts subject to these regulations, such as the discharge of dredged material into shallow open water areas to create wetlands and the placement of rock for shoreline protection, is evaluated in accordance and compliance with Section 404(b)(1) of the Clean Water Act (**appendix C**). The evaluation of potential impacts to water quality indicate that, on the basis of the guidelines, the proposed disposal sites for the discharge of dredged material and stone comply with the requirement of these guidelines, with the inclusion of appropriate and practicable best management practices to minimize adverse effects to the aquatic ecosystem.

COASTAL ZONE MANAGEMENT ACT OF 1972

Section 307 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1456(c)(1)(A)) directs Federal agencies proposing activities or development projects (including civil work activities), whether within or outside the coastal zone, assure that those activities or projects are consistent, to the maximum extent practicable, with the approved state coastal zone management program. A Coastal Zone Consistency Determination is included in **appendix D** and was submitted to the Louisiana Department of Natural Resources (LDNR) for consistency review concurrent with the release of the DEIS for public comment. Implementation of the 1% alternative is considered consistent, to the maximum extent practicable, with the approved Louisiana State Coastal Management Program.

FARMLAND PROTECTION POLICY ACT

Congress passed the Farmland Protection Policy Act (FPPA) as a result of a substantial decrease in the amount of open farmland. The purpose of the Act is to minimize the extent to which Federal actions contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. Correspondence from NRCS dated January 4, 2013indicated that the proposed construction areas would not impact prime farmland and therefore is exempt from the rules and regulations of the Farmland Protection Policy Act (**appendix H**).

FISH AND WILDLIFE COORDINATION ACT OF 1958

The USACE and the Department of the Interior - U.S. Fish and Wildlife Service (USFWS) have formally committed to work together to conserve, protect, and restore fish and wildlife resources while ensuring environmental sustainability of our Nation’s water resources under the January 22, 2003, Partnership Agreement for Water Resources and Fish and Wildlife. The USFWS entered into an agreement to serve as a Cooperating Agency (per National Environmental Policy Act (NEPA) section 1501.6) in developing the RPEIS for the proposed project in accordance with applicable NEPA and Council on Environmental Quality (CEQ) guidance. Participation of the USFWS includes: 1) participating in meetings and field trips to obtain baseline information on project-area fish and wildlife resources; 2) evaluating the proposed project's impacts to wetlands and associated fish and wildlife resources, and assisting in the development of measures to avoid, minimize, and/or compensate for those impacts; and 3) providing technical assistance in the development of a biological assessment (BA) describing the impacts of the proposed activity to Federally listed threatened and endangered (T&E) species and/or their critical habitat. A list of the major mitigation and conservation measures recommended by the USFWS in their FWCA Report, dated July 20, 2000, and the USACE responses to those recommendations are provided at website http://1.usa.gov/ZVel3A. The Service provided a Final Fish and Wildlife Coordination Act Report (FWCAR) on March 28, 2013 which is included in **appendix B**. Positions and recommendations by the USFWS are listed below.

USFWS Conservation Recommendations: Avoidance and minimization of direct wetland impacts should be pursued to the greatest extent practicable. The Service does not oppose the implementation of the constructible features and provides the following recommendations to avoid and/or minimize project impacts on fish and wildlife resources, and for mitigating unavoidable impacts to those resources.

1. The Post Authorization Change Report, in keeping with the project's Congressional Authorization, should clearly reiterate that features of the Tentatively Selected Plan will be designed to maintain existing freshwater inflows from the Atchafalaya River via the Gulf Intracoastal Waterway. Those designs shall accommodate restoration needs determined via future restoration planning, to the extent possible. The Service also recommends that the Corps provide the Service with the opportunity to review and comment on model assumptions and input data prior to initiating the modeling analyses necessary to complete those tasks. Tasks should include the following:

> *a. Future design of the Grand Bayou Floodgate should accommodate southward freshwater flows.*
> *b. Construction of Reach L and K levees should avoid use of material dredged from Grand Bayou Canal and from the Cutoff Canal so that saltwater intrusion via those channels is not increased.*
> *c. The eastern Gulf lntracoastal Waterway (GIWW) floodgate should have the smallest possible cross-section to reduce the loss of Atchafalaya River freshwater to the Barataria Basin and to retain that freshwater within the Terrebonne Basin.*
> *d. The design of the west GIWW floodgate should avoid stage increases west of that structure and should be capable of passing Atchafalaya River freshwater flows, especially during periods of high Atchafalaya River stages, without any loss of flow.*
> *e. The two environmental water control structures along Falgout Canal should be designed and operated to only discharge freshwater southward and not to allow northward flow of saltwater into Falgout Canal.*

Corps Response: Concur. Items a through e are either all ready planned or would be evaluated during PED. USACE would closely coordinate with the resource agencies including the Service in design and modeling efforts. USACE intends to design the features of the project to not limit freshwater inflows from the Atchafalaya River and without limiting restoration opportunities.

2. The Corps should coordinate closely with the Service and other fish and wildlife conservation agencies throughout the pre-construction *engineering and design phase of project features including levees, floodgates, and environmental water control structures 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.*

Corps Response: Concur. The Corps would continue to coordinate with the Service and other resource agencies throughout pre-construction, engineering and design phase of the project.

3. Operational plans for floodgates and water control structures, excluding the Falgout Canal environmental structures, the HNC Lock Complex, and the east GIWW floodgate, should be developed to maximize the open cross-sectional area for as long as possible. Operations to maximize freshwater retention or redirect freshwater flows could be considered if hydraulic modeling demonstrates that is possible and such actions are recommended by the natural resource agencies. Development of water control structure operation manuals or plans should be done in coordination with the Service and other natural resource agencies.

Corps Response: Concur. In coordination with the HET, the Corps and non-Federal sponsors refined the structure operation plan. The Corps would continue to coordinate with the Service and other resource agencies throughout the project design and implementation.

4. To the greatest extent possible, the Bayou Grand Caillou floodgate should remain open during HNC Lock Complex saltwater closure periods to maintain water exchange in this natural bayou and thereby reduce or avoid impacts to fish access.

Corps Response: Concur. During closure of the HNC lock and floodgate the Bayou Grand Caillou floodgate would remain open.

5. The location of the Barrier Reach, Reach A, and the Larose to Lockport levees should be modified to reduce direct wetland impacts and enclosure of wetlands, to the degree possible. Features such as spoil bank gapping or other measures should also be added to avoid impacts to enclosed wetlands due to unintentional impaired drainage. The Corps should coordinate with the Service and other natural resource agencies to develop the best approach for avoiding drainage impacts.

Corps Response: Partially Concur. During the PED phase USACE would look for ways to reduce direct and indirect impacts including modeling of ECS for impounded areas. Reach A would include box culverts to reduce any potential indirect impacts to water exchange. However, the alignment would remain as demonstrated in the DRPEIS but can be shifted slightly.

6. Estimates of all direct and indirect project-related wetland impacts, including those associated with fisheries impacts and/or changes in freshwater inflows and distribution, should be refined during the engineering and design phase, including indirect impacts associated with the constructible features should the changes be made in the March 2013 structure operation plan (Appendix B).

Corps Response: Concur. The potential project-induced environmental consequences to significant resources would be more thoroughly documented to include not only magnitude of potential changes, but also the extent, direction, duration of potential changes, and speed of potential changes. The Final RPEIS would include a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system would also be compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. Future system wide modeling is intended to look at various SLR scenarios.

7. To determine acreage of forested habitat types impacted by future levee construction activities, those acreages should be obtained by digitizing current aerial imagery and ground truthing, rather than through use of 2008 NWI data.

Corps Response: Concur. The best available data would be used at the time of analysis.

8. To the greatest degree practical, the hurricane protection levees and borrow pits should be located to avoid and minimize direct and indirect impacts to emergent wetlands. Efforts should be made to further reduce those direct impacts by hauling in fill material, using sheetpile for the levee crest, deep soil mixing, or other alternatives. Borrow pit construction should also avoid the following:

a. avoid inducing wave refraction/diffraction erosion of existing shorelines
b. avoid inducing slope failure of existing shorelines
c. avoid submerged aquatic vegetation
d. avoid increased saltwater intrusion
e. avoid excessive disturbance to area water bottoms
f. avoid inducing hypoxia

A plan for monitoring borrow pit dissolved oxygen concentrations should also be developed to assess if hypoxia occurs in pits used for levee construction (provided construction is not from a navigation channel) and in pits needed for mitigation construction. Recommended hypoxia monitoring is as follows:

Measure specific conductance, temperature, dissolved oxygen, and pH in at least one location in the borrow pit. A calibrated multiparamter probe should be used. The sites(s) should be profiled at 5 to 10-ft intervals, depending on depth and conditions, from the water bottom to the surface. Samples should be collected one time during each of the months of April, September, and October, and twice a month, about 2 weeks apart, during May through August. Sampling frequency should be increased to twice monthly during September and October as necessary.

Corps Response: Concur. To the extent practicable USACE agrees with items a through f. Borrow pit designs would be based on the best data on how to avoid the impacts listed above. Monitoring for dissolved oxygen may be considered. The current analyses of direct impacts are most likely a liberal estimate. The Corps would attempt to reduce those impacts by locating borrow from open water areas, hauling fill, etc. in the next phase.

9. When organic soils must be removed from the construction site, that material should be used to create or restore emergent wetlands to the greatest extent practicable. If that is not practicable, then use of that material to improve borrow pit habitat quality (e.g., construct bank slopes, reduce depths, etc.) should be examined.

Corps Response: Concur. The existing plans include the use of organic overburden to create marsh along the levee alignment.

10. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

Corps Response: Concur. Impacts to nesting migratory birds would be avoided to the greatest extent practicable.

11. A void adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. Surveys prior to construction should be undertaken by the construction agency to ensure no nesting birds are within 1,000 feet of any proposed work. If nesting birds are found within 1,000 feet of any proposed work sites, the Service and the Louisiana Department of Wildlife and Fisheries should be contacted for procedures to avoid impacts.

Corps Response: Concur. Project implementation would follow the National Bald Eagle Management Guidelines. In addition, pre-construction surveys would be taken of the area and on-site personnel would be informed of the possible presence of nesting birds within the project boundary, and would identify, avoid, and immediately report any such nests to the proper authorities.

12. Full, in-kind compensation (quantified as AAHUs) should be provided for unavoidable net adverse impacts on forested wetlands, marsh, and associated submerged aquatic vegetation, including any additional losses identified during post-authorization engineering and design studies. Mitigation planning, including site selection and design, should be closely coordinated with the Service and other interested natural resource agencies. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.

a. Mitigation measures should be constructed concurrently with the features that they are mitigating (i.e., mitigation should be completed no later than

18 months after levee construction has begun. Completion of mitigation means that initial fill elevations have been achieved. If mitigation is provided via an in-lieu fee program, completed mitigation would be achieved when credits were purchased from an approved mitigation bank.

b. *If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal losses of wetland and Essential Fisheries Habitat functions.*

c. *Proposed mitigation in the open water area south of Falgout Canal (in subunit B13) should be coordinated with ongoing Corps Regulatory Branch mitigation plans to avoid conflicts.*

d. *In coordination with the Service and other fish and wildlife conservation agencies, the Corps should address the Environmental Protection Agency's 12 requirements for each mitigation measure (Appendix B).*

e. *Mitigation performance should be assessed using the final performance criteria currently being developed by the Corps and natural resource agencies for the Hurricane Storm Damage Risk Reduction Study.*

f. *The Service and other fish and wildlife conservation agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans.*

g. *Unavoidable impacts to wetlands within Mandalay National Wildlife Refuge should be mitigated on the refuge.*

h. *The acreage of marsh created to mitigate project impacts should meet or exceed the marsh acreage projected by the Habitat Evaluation Team for target year 5. If deficiencies occur in year 5 acres, additional mitigation shall be provided.*

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

j. *To avoid shortfalls in marsh creation acreage, the contractor should be required to guarantee the creation of at least the target acreage of marsh platform, or excess acres should be created.*

k. *The acreage of marsh created for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life to evaluate project impacts, the effectiveness of compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.*

l. *Dredged material borrow pits, including those utilized to create marsh for mitigation purposes, should be carefully designed and located to minimize anoxia problems and excessive disturbance to area water bottoms, and to avoid increased saltwater intrusion.*

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

Corps Response: Concur with all items above except item i. In accordance with the project's statutory authority, the proposed mitigation actions would include construction, with the Non-Federal Sponsor (NFS) responsible for operation, maintenance, repair, restoration, and rehabilitation (OMRR&R) of functional portions of work as they are completed. On a cost-shared basis, USACE would monitor completed mitigation to determine whether additional activities (ex. further construction, additional plantings, etc.) are necessary to achieve mitigation success. USACE would undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved specified initial success criteria, monitoring & maintenance would be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet subsequent success criteria, USACE would consult with other agencies and the NFS to determine whether operational/management changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve this success, USACE would instruct the NFS to implement adaptive management measures in accordance with contingency plans and subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.

13. Additional information is needed by the Service to complete the required evaluation of project effects and fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act. Much of that information will not be available until engineering and design of the project features has progressed. To help ensure that sufficient information is provided, the Service recommends that the Corps perform the following tasks during the engineering and design phase.

1. Provide additional information on anticipated construction techniques and their associated wetland impacts, such as additional dredging to install floodgates and water control structures, dredging temporary by-pass channels, and the method for disposing organic surface soils that are unsuitable for levee construction.

2. Provide final locations and designs for borrow sites used in levee construction.

Corps Response: Concur. During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would specifically focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system.

14. Funding should be provided for full Service participation in the post-authorization engineering and design studies, and to facilitate fulfillment of its responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act.

Corps Response: Concur. Funding would be/has been provided.

15. The Corps should obtain a right-of-way from the Service prior to conducting any work on Mandalay National Wildlife Refuge, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination by the Service's Regional Director that the proposed work will be compatible with the purposes for which the Refuge was established.

Corps Response: The Corps concurs that the non-Federal sponsor should obtain the appropriate real estate interest prior to conducting any work on the Mandalay National Wildlife Refuge, in conformance with Section 29.21-1 et seq., Title 50.

16. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on Mandalay National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (985/853-1 078) for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

Corps Response: Concur. The Corps would contact the Refuge Manager to obtain the required Special Use Permit. Coordination between the appropriate agencies would be maintained.

17. If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements. A summary of some of those requirements was provided in appendix C to our May 2012 Coordination Act Report. Other land-managing natural resource agencies may have similar requirements that must be met prior to accepting mitigation lands; therefore, if an agency is proposed as a manager of a mitigation site, they should be contacted early in the planning phase regarding such requirements.

Corps Response: Concur

18. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Point au Chene Wildlife Management Area (985-594-5494).

Corps Response: Concur. The Corps would contact the LDWF prior to any work on Point au Chene Wildlife Management Area.

To fully evaluate indirect impacts of MTG structure operations on enclosed wetlands and fisheries access, the Service provides the following recommendations regarding information needed to conduct a full assessment of indirect project impacts and benefits.

1. *Because stages are generally higher along the more exposed MTG east side, historic stage data (in NAVD88) from locations near proposed MTG east-side floodgates should be provided to the Service to facilitate prediction of future closure durations for floodgates along the MTG east side.*

2. *Hydraulic model runs to predict salinities at target year 50 year were conducted for the medium and high sea level rise scenarios, but not for the low sea level rise scenario. Model runs should also be conducted to predict salinities at target year*

50 for the low sea level rise scenario.

3. *Conduct fish passage modeling during the preconstruction engineering and design phase if determined necessary through continuing coordination with interested resource agencies. At a minimum, this should consist of Particle Tracking Method.*

Corps Response: Concur with all information needs above.

ENDANGERED SPECIES ACT OF 1973

Compliance with the Endangered Species Act (7 U.S.C. 136; 16 U.S.C. 460 *et seq*.) has been coordinated with the USFWS and the National Oceanic and Atmospheric Administration (NOAA) for those species under their respective jurisdictions. The BA (appendix A) associated with the 2002 feasibility report concluded, "Neither of the two action alternatives would have adverse impacts upon threatened and endangered species provided work areas do not expand to the south of the study area. . ."

As part of the ESA Section 7 consultation process also associated with the 2002 feasibility report, the NMFS concluded, by letter of March 18, 2002 (Appendix H), ". . .the proposed action is not likely to adversely affect any listed species under NMFS' purview for any of the plan alternatives."

It should be noted that the alternatives examined in the 2002 feasibility report are similar, but not exactly the same, as the two action alternatives in this RPEIS and associated PAC report. There are no longer plans to look offshore for sand. It is the USACE determination that there would be No Affect to Threatened or Endangered Species or their critical habitat due to the Morganza to the Gulf Risk Reduction Project. In the Final CAR received from USFWS on March 28, 2013 the Service provided their concurrence (appendix B).

LOUISIANA STATE RARE, THREATENED AND ENDANGERED SPECIES, AND NATURAL COMMUNITIES COORDINATION

The USACE reviewed the database maintained by the Louisiana Natural Heritage Program that provides the most recent listing and locations for rare, T&E species of plants and animals and natural communities within the State of Louisiana. The proposed action would not adversely impact any rare, T&E species, or unique natural communities. The proposed action would increase the extent of fresh, intermediate, brackish and saline marsh as well as swamp habitat and ridge habitat in the project area (see also **section 5.2.7**).

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT OF 1996 AND THE MAGNUSON-STEVENS ACT REAUTHORIZATION OF 2006 (ESSENTIAL FISH HABITAT)

As directed by the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 104-297), the USACE has coordinated with the NMFS and that agency's experts on various marine organisms, as well as EFH. Consultation with NMFS has been completed. EFH conservation recommendations are listed below and correspondence included in appendix H.

NMFS EFH Conservation Recommendations

NMFS Recommendation: *Impacts, including frequency and duration of closure for all water control structures, should be assessed for reasonably foreseeable future actions. Such an analysis should include operation for non-storm closures at +2.5 ft. NA VD88 at low, intermediate, and high sea level rise scenarios.*

USACE Response: In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" would be included in the Final RPEIS**.**

NMFS Recommendation: *Indirect impacts should be determined for constructible and programmatic features through coordination with NMFS and other interested natural resource agencies. System-wide modeling should be conducted on features and structure sizes included in the TSP to complete impact assessments. Modeling results of the low sea level rise scenario at the end of the project life should be included in the final RPEIS.*

USACE Response: For the programmatic features, the Final RPEIS will include a qualitative analysis of indirect and cumulative impacts. The Final RPEIS will better explain the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc). RPEIS will describe what the adverse impacts to each of these resources could be under different sea level rise scenarios. Re-analysis would consider the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. For the constructible features, the HET has run full WVAs for 4 scenarios to give a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future. (4) High RSLR & more frequent closure in the future. Currently, the system wide model cannot address RSLR. If the project is re-authorized, additional system wide modeling can be conducted to quantify RSLR impacts.

NMFS Recommendation: *A clarified operation plan for the HNC lock, floodgates, and environmental water control structures should be developed through coordination with NMFS and other natural resource agencies. Those operation plans should be clarified to show:*

> *a. The environmental water control structures along Falgout Canal in Reach E 1 would be operated to discharge fresh water southward only.*
>
> *b. The BG C floodgate would remain open during the HNC lock saltwater closure periods.*

> *c. Operation plans for floodgates and water control structures, excluding the Falgout Canal environmental water control structures and the HNC lock, would maximize the open cross sectional area as often and long as possible.*

USACE Response: In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" will be included in the Final RPEIS.

NMFS Recommendation: *An adequate mitigation plan for constructible and programmatic features should be developed to offset updated direct and indirect impacts through coordination with NMFS and other interested natural resource agencies. The mitigation should consist of marsh creation in open water on the flood side of the proposed levee. The mitigation should be planned, fully funded, and implemented in a concurrent timely manner such that functional and temporal losses of EFH are offset. Revised mitigation details should be made available for public and agency review and comment prior to issuing the Final RPEIS or signing the ROD. Specific mitigation details we recommend be included in the Final REIS include:*

> *a. Final sizing of mitigation*
> *b. The specific limits of constructible mitigation features*
> *c. Spill boxes should be directed into adjacent deteriorating marsh to the greatest extent practicable.*
> *d. Construction staging areas should be located to avoid impacts to wetlands.*
> *e. Target fill elevations should be based upon a determination of average healthy marsh in the vicinity of the mitigation project in accordance to bio-benchmark surveying methods used for restoration programs. The version of geoid height model used when selecting target elevations should be documented. Target elevations and monitoring elevation data should be presented with the same geoid height model correction.*

USACE Response: The mitigation plan proposed for the constructible elements of the project has been revised. It now accounts for mitigation of both direct and indirect habitat impacts and contains specific limits of proposed mitigation features, which consist of marsh restoration (creation) features located in open water areas on the flood side of the proposed levee system. These revisions were coordinated with the HET. This revised plan now also addresses your comments "a" through "e". However, this revised plan does not yet identify specific staging areas, borrow sites, and construction access corridors, nor are the target marsh elevations based on field surveys of nearby healthy marshes. The revised mitigation plan for the constructible elements would be included in the final RPEIS and can be reviewed during the 30-day state and agency review period. Further refinements to this mitigation plan would occur during the PED phase in close coordination with the HET, other PDT members, and the non-Federal Sponsors. During this phase: survey data would be gathered to establish marsh target elevations in accordance with your recommendation; spill box locations would be identified; staging areas would be located to avoid wetland impacts to the extent practicable; borrow sites and construction access corridors would be located to avoid wetland impacts to the extent practicable. More specific mitigation plans for habitat impacts associated with the programmatic project elements would be prepared as part of future supplemental NEPA documents.

NMFS Recommendation: *An acceptable gapping/degrading plan for containment dikes constructed for marsh creation mitigation should be included through developmental coordination with NMFS. General design for dike gapping should include:*

a. If total dike degradation is not feasible, one 25-ft gap (bottom width) every 500 ft. is recommended. Depth of gap is dependent on if it is into open water or adjacent marsh. If into open water, gaps should be to the pre-project water depth. If gaps lead into marsh, gap should be to average marsh elevation.

b. If scour aprons are included, the bottom should be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.

c. Degraded material should be placed on adjacent remaining dikes and not marsh.

d. Field adjustments in spacing and dimension based on developing site conditions should

be accomplished through coordination with NMFS.

USACE Response: Engineering design criteria would be refined with consideration of your suggestions and coordinated with NMFS and the other resource agencies. This will be clearly documented in the final RPEIS. Note that the revised mitigation plan for the constructible elements of the project would not require any “gapping” of temporary retention (containment) dikes since all such dikes would be manually degraded to equal the final target elevations of the proposed marsh restoration features when practicable without causing adverse impacts. This approach will be documented in the final RPEIS.

NMFS Recommendation: *Performance standards, monitoring requirements, long-term management, and the adaptive management plan should be revised to be consistent with those currently under development for the Greater New Orleans Hurricane Surge Damage Risk Reduction System.*

USACE Response: The proposed mitigation plan for impacts associated with the constructible elements of the project was revised to be more consistent with the current Greater New Orleans HSDRRS mitigation standards you mention. The adaptive management plan has been revised consistent with applicable laws, regulations and policy. More detailed mitigation performance standards, monitoring requirements, long-term management activities, and adaptive management plans would be developed during PED phase of constructible elements as well as provided in future supplemental NEPA documents prepared for the programmatic elements of the project. The revised plans will be contained in the final RPEIS.

NMFS Recommendation: *The USACE should remain responsible for mitigation until the mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria. An acceptable adaptive management plan should be developed through coordination with NMFS and other interested natural resource agencies to cover operation and maintenance of the levees and structures, and mitigation. Sufficient appropriated funds should be set aside to fulfill the plan especially as it relates to mitigation compliance.*

USACE Response: The USACE will execute its responsibilities, consistent with all applicable laws, regulations and policies, regarding mitigation compliance, adaptive management and monitoring, and funding consistent. This would include, but is not limited to meeting vegetation, elevation, acreage, gapping and other developed performance standards and criteria for the mitigation plan. The USACE will coordinate with the NMFS and other resource agencies for development of more detailed mitigation, adaptive management, and monitoring plans during the PED phase for constructible project features as well as during future development of programmatic project features. In accordance with WRDA 2007 Section 2036 and 2039 the project has developed a monitoring and adaptive management for the mitigation plan not the entire project. The project is not required to develop monitoring and adaptive management for the other project features included since it is not an ecosystem restoration project. In accordance with the project's statutory authority, the proposed mitigation actions will include construction, with the Non-Federal Sponsor (NFS) responsible for operation, maintenance, repair, restoration, and rehabilitation (OMRR&R) of functional portions of work as they are completed. On a cost-shared basis, USACE will monitor completed mitigation to determine whether additional activities (ex. further construction efforts, additional plantings, etc.) are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved specified initial success criteria, monitoring & maintenance would be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet subsequent success criteria, USACE will consult with other agencies, including NMFS and the NFS to determine whether operational/management changes would be sufficient to achieve ecological success criteria.

Mitigation plans for compensating habitat impacts associated with the programmatic project elements would be provided in future supplemental NEPA documents. These mitigation plans would include AMPs if necessary and would be developed by USACE in coordination with NMFS, other interested resource agencies, the Project Delivery Team (PDT), and the NFS.

An Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) Manual will be prepared by USACE for completed habitat mitigation elements. Preparation of this document would be coordinated with NMFS, other resource agencies, the PDT, and the NFS. It will cover an array of mitigation topics including, but not necessarily limited to; monitoring and reporting requirements, success criteria, maintenance/management/operational requirements and guidelines, and applicable AMPs. The final mitigation OMRR&R Manual will be provided to the NFS once USACE transfers mitigation responsibilities to the NFS.

The USACE will prepare Water Control Plans (WCPs) regarding the operation of proposed levee system structures that control water movement/flows and will provide such WCPs to the NFS upon construction completion of levee reaches. The proposed project may include water control structures that are integral to the success of proposed habitat mitigation features and/or whose proper operation is critical to avoiding, minimizing, or mitigating potential adverse impacts to Essential Fish Habitats or fisheries resources. In such cases, preparation of the WCP would be coordinated with NMFS, other appropriate resource agencies, the PDT, and the NFS.

The Project Partnership Agreement between the NFS and the Federal Government provides the required financial assurance for the proposed mitigation. In the event that the NFS fails to perform, the USACE has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature, including mitigation features, but such action would not relieve NFS of its responsibility to meet its obligations and would not preclude the USACE from pursuing any remedy at law or equity to ensure the NFS's performance.

MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

Bald eagles, brown pelicans and colonial nesting birds are known to frequent the project area. Specific guidelines would be followed in order to minimize any potential impacts to nesting birds. The project is in compliance with the Migratory Bird Conservation Act, 16 U.S.C. 715-715d, 715e, 715f-715r; 45 Stat. 1222 and the Migratory Bird Treaties and other international agreements listed in the Endangered Species Act of 1973, as amended, Section 2(a)(4).

NATIONAL HISTORIC PRESERVATION ACT OF 1966

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended and 36 CFR 800, Federal agencies are required to identify and consider 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. 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 USACE, the Louisiana SHPO, and any consulting Indian groups. 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.

USACE concluded that “the constructible features would have no impacts to cultural resources,” and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and the following eleven federally-recognized Tribes on June 15, 2012, pursuant to the 36 C.F.R. §800 regulations implementing Section 106 of the National Historic Preservation Act: 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 letter dated February 26, 2013, the SHPO concurred that “no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate,” and as such “have no objections to the implementation of this portion of the project.” The SHPO concurrence was coordinated with federally-recognized tribes in a letter dated March 5, 2013. An uncharacterized shell concentration identified in Reach E near Falgout Canal requires testing and evaluation. USACE would proceed with testing and evaluation of this locus once access is gained during PED.

USACE would continue Section 106 consultation for the programmatic features through the identification and evaluation of historic properties as the plans for the features are refined. (**appendix H**).

RESOURCE CONSERVATON AND RECOVERY ACT (RCRA) AS AMENDED BY THE HAZARDOUS AND SOLID WASTE AMENDMENTS (HSWA) OF 1984

A Phase I Environmental Site Assessment ESA was performed as part of this project and complies with the requirements of RCRA and HSWA. The ESA that was completed on February 1, 2010 can be found in **appendix L**.

EXECUTIVE ORDER 11988, FLOOD PLAIN MANAGEMENT

Executive Order 11988 directs all Federal agencies to avoid, if possible, development and other activities in the 100-year base floodplain. Federal agencies are required to:

- Reduce the risk of flood loss
- Minimize the impact of floods on human safety, health, and welfare
- Restore and preserve the natural and beneficial values served by floodplains in carrying out agency responsibility.

The 1% Alternative would directly support a reduction in hazards and risks associated with flooding and would minimize the impact of floods on human safety, health, and welfare. The project would support the restoration and preservation of the natural and beneficial values of the base floodplain. The study is in compliance with Executive Order 11988.

EXECUTIVE ORDER 11514, PROTECTION OF ENVIRONMENT

EO 11514, Protection and Enhancement of Environmental Quality, directs Federal agencies to "*initiate measures needed to direct their policies, plans and programs so as to meet national environmental goals*." This project complies with EO 11514.

EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

EO 11990, Protection of Wetlands, works 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. This project seeks to avoid direct and indirect impacts to wetlands in both the levee and borrow footprints to the extent practicable. This project complies with the goals of EO 11990.

EXECUTIVE ORDER 13186, MIGRATORY BIRD HABITAT PROTECTION

Section 3a and e of EO 13186 directs Federal agencies to evaluate the effects of their actions on migratory birds, with emphasis on species of concern, and inform the USFWS of potential negative effects to migratory birds. Implementation of the 1% alternative is not anticipated to have a measurable negative effect on migratory bird populations.

EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE

Title VI, Section 601 of the Civil Rights Act of 1964 (Public Law 88-352) states:

"No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."
On February 11, 1994, President Clinton issued EO 12898 regarding Federal actions to address environmental justice (EJ) issues in minority populations and low-income populations:

> *"To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice 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, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands."*

EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EO 12898 focuses Federal attention on the environmental and human health conditions in the minority and low-income communities, enhances the provisions of nondiscrimination in Federal programs affecting human health and the environment, and promotes meaningful opportunities to the access of public information and participation in matters relating to minority and low-income communities and their environment. The EO is directed internally to all Federal departments and Federal agency heads to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations.

Potential EJ issues have been considered and would continue to be considered through the development of supplemental NEPA documents and project implementation. As part of the NEPA process, an input request was provided to interested parties. Comments were received requesting a census block level analysis for any potential EJ issues. The USACE is committed to ensuring that any potential EJ issues are addressed as the study proceeds. As project specifications were developed, concern was expressed regarding the areas outside the system where induced flooding would be expected to occur. Twenty-four census blocks comprise the communities identified as having induced flooding from the 1% alternative and include parts of Gibson, Bayou Dularge, Dulac, and all of Cocodrie and Isle de Jean Charles. The analysis identified the communities of Gibson, Bayou Dularge, Dulac, and Isle de Jean Charles as EJ communities based on percent minority and/or low-income. The USACE has assumed the worst-case compensation scenario for the impacted communities outside of the project alignment. Should this scenario prove to be the appropriate mitigation method, at least 2,500 people would need to be relocated to areas behind the Federal protection system through 100% buy-out and uniform relocation assistance. In order to minimize any other potential disproportionate impacts resulting from construction of the levee alignment, additional analysis and outreach to these communities would be conducted and documented in supplemental NEPA reports. A full write-up regarding consistency with EO 12898 is provided in the Environmental Justice section of this document and Appendix J.

EXECUTIVE ORDER 13112, INVASIVE SPECIES

On February 3, 1999, President Clinton issued EO 13112 establishing the National Invasive Species Council to prevent the introduction of invasive species, provide for their control, and to minimize the economic, ecological, and human health impacts resulting from invasive species. The tentatively selected plan is consistent with EO 13112. Only native plant species would be utilized in the implementation of the 1% alternative. Implementation of the tentatively selected plan would adhere to programs and authorities preventing the introduction or spread of invasive species in the study area.

8. LIST OF PREPARERS

Many individuals were involved with the completion of this document. The following table lists those people who contributed to this RPEIS.

Table 8-1. List of RPEIS Preparers/Contributors

US Army Corps of Engineers, New Orleans District Team Members			
Name	**Affiliation**	**Discipline**	**Role in Present Study**
Alpine, Tate	ERDC	Hydraulic Engineer	RPEIS – H&H Modeling
Brown, Christopher	CEMVN	Biologist	HTRW
Carithers, Clay	CEMVN	Biologist	Mitigation
Coulson, Getrisic	CEMVN	Planner/Social Scientist	Environmental Justice
Creel, Travis	CEMVN	Planner	Plan Formulator
Dayan, Nathan	CEMVN	Fishery Biologist	Environmental Manger -RPEIS oversight and review
Deloach, Pamela	CEMVN	Project Engineer	RPEIS – Engineer Technical Lead
Fontenot, Kayla	CEMVN	Social Scientist	Socio-Economics/Environmental Justice
Gilmore, Tammy	CEMVN	Biologist	RPEIS - Final Comment Resolution – T&E; Wildlife; EFH
Gutierrez, Judy	CEMVK	Real Estate Specialist	RPEIS – Final Comment Resolution - Real Estate
Glisch, Eric	CEMVN	Environmental Engineer	Water Quality/Hydrology & Hydraulics
Henville, Amena	CEMVN	Hydraulic Engineer	RPEIS – Final Comment Resolution – H&H
Hill, Rebecca	CEMVN	Archeologist	Tribal Affairs
Hughbanks, Paul	CEMVN	Archeologist	Cultural Resources
Klein, William	CEMVN	Wildlife Biologist	RPEIS - Final Comment Resolution/Adaptive Management
Kinsey, Mary	CEMVN	Attorney	Legal Review
Landry, Amanda	CEMVN	Engineer	RPEIS review
Leroux, Patricia	CEMVN	Biologist	RPEIS – Preparation of Final Document
Maestri, Brian	CEMVN	Economist	Economics
Mickal, Sean	CEMVN	Planner	RPEIS - Final Comment Resolution
Musso, Joe	CEMVN	Biologist	RPEIS - Final Comment Resolution – Air Quality
Northey, Robert	CEMVN	Attorney	Legal Review
Perez, Andrew	CEMVN	Recreation Specialist	Environmental Justice/Recreation

Radford, Richard	CEMVN	Landscape Architect	Aesthetics
Stark, Elaine	CEMVN	Engineer	Project Manger/RPEIS review
Stiles, Sandra	CEMVN	Supervisory Environmental Resource Specialist	RPEIS – Manage and review document for technical sufficiency
Vance, Karen	CEMVK	Real Estate Specialist	RPEIS – Final Comment Resolution; Real Estate
Washington, Danielle	CEMVN	Hydraulic Engineer	RPEIS – Final Comment Resolution – H&H
Whalen, Dan	CEMVN	Economist	Economics
Williams, Eric	CEMVN	Archeologist	Environmental Justice
State and Federal Interagency Team Members			
Baumgart-Getz, Adam	U.S. Geological Survey	Geographer	Habitat Evaluation Team
Boudreaux-Meyers, Michelle	U.S. Geological Survey	Biologist	Adaptive Management
Dupre, Reggie	Terrebonne Levee Conservation District	Executive Director	Local Sponsor
Ettinger, John	U.S. Environmental Protection Agency	Environmental Protection Specialist	Habitat Evaluation Team
Hebert, Barry	Louisiana Department of Wildlife and Fisheries	Biologist	Habitat Evaluation Team
Langlois, Summer	Coastal Protection & Restoration Authority	Coastal Resources Scientist	Habitat Evaluation Team
McMenis, James	Coastal Protection & Restoration Authority	Coastal Resources Scientist	Local sponsor
Marks, Brian	Louisiana Department of Natural Resources	Coastal Resources Scientist	Habitat Evaluation Team
Marmande, Mitch	T. Baker Smith/Terrebonne Levee Conservation District	Engineer	Local Sponsor (Contractor)
Paille, Ronnie	U.S. Fish and Wildlife Service	Biologist	Habitat Evaluation Team
Steyer, Cindy	U.S. Dept. of Agriculture, Natural Resources Conservation Service	Coastal Vegetative Specialist	Habitat Evaluation Team
Williams, Patrick	National Marine Fisheries Service	Fishery Biologist	Habitat Evaluation Team
Contractor Team Members			
Wadsworth, Lisa	HDR	Engineer	Project Manager/RPEIS review
Carnes, Laura	GEC, Inc.	Environmental Scientist	DRPEIS preparation and management
Hudson, George	GEC, Inc.	Hydrologist	Hydrology & Hydraulics

Lindquist, Jennifer	GEC, Inc.	Geologist	Geology/Soils/Climate
Loden, Michael	GEC, Inc.	Environmental Scientist	RPEIS preparation and management
Marschall, Lauren	GEC, Inc.	Geographer	GIS/Mapping
Rogers, Donna	GEC, Inc.	Fishery Biologist	Fisheries/EFH

9. PUBLIC INVOLVEMENT

In compliance with USACE policies and NEPA, input on projects is solicited from the public and other government agencies. The public was invited to comment during the scoping process and during public meetings, and comments would be solicited for this document. USACE would continue to coordinate with the communities and the public and would hold additional public meetings.

9.1 Agency Coordination

Preparation of the Morganza to the Gulf of Mexico PAC report and RPEIS has been coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties as listed below:

- United States Fish and Wildlife Service, Louisiana and Mississippi
- United States Environmental Protection Agency, Region VI
- National Marine Fisheries Service, Louisiana and Mississippi
- Natural Resources Conservation Service, Louisiana
- State Historic Preservation Officer
- Advisory Council on Historic Preservation,
- Louisiana’s Governor’s Executive Assistant for Coastal Activities
- Louisiana Department of Wildlife and Fisheries
- Louisiana Department of Natural Resources, Coastal Management Division
- Louisiana Department of Natural Resources, Coastal Restoration Division
- Louisiana Department of Environmental Quality
- Terrebonne Levee and Conservation District

9.2 Scoping and Interagency Coordination

Public involvement has been a key component of this study since its inception in the 1990s. A Notice of Intent to prepare a Draft EIS was published in the *Federal Register* on April 7, 1993, and invited public comment. A public scoping meeting was held in Houma, Louisiana, on May 12, 1993. The purpose of the meeting was to provide interested parties with information regarding the project and to answer questions. A scoping document summarizing all comments and concerns voiced in the public meeting and in letters to the USACE was sent to all stakeholders on April 12, 1994. These issues and concerns were later considered during the planning and analysis of project alternatives.

The greatest area of public concern was related to the importance of providing hurricane, storm, and flood damage risk reduction for businesses and residences. Other concerns included potential adverse impacts to existing marshes, improvement of marsh habitat both inside and outside the proposed levee system, maintaining or improving ingress and egress of marine organisms for the benefit of commercial fisheries, and avoiding adverse water quality impacts. A more detailed summary of the public scoping comments can be found in the 2002 Morganza to the Gulf FPEIS, available online: http://www.mvn.usace.army.mil/prj/mtog.

As the study progressed, its magnitude and complexity became evident, and it was found to be difficult to determine all the details of such a large-scale system during the feasibility phase. Therefore, it was decided that a Programmatic EIS would be more appropriate for the project than the original EIS first envisioned. Impacts of an overall hurricane protection system for this area and a mitigation plan would be presented with as much detail as possible, but additional NEPA and other environmental documentation would disclose details of the various components and impacts of the project when designs were finalized. A Notice of Intent concerning the change to a Programmatic DEIS was issued in the *Federal Register* on October 22, 1999.

An interagency habitat evaluation team was formed in 1995 to evaluate impacts of proposed plans, suggest methods for reducing impacts, develop compensatory mitigation if needed, and to suggest monitoring efforts. The team is still active and is comprised of representatives from CEMVN, TLCD, USFWS, NMFS, NRCS, LDNR, and LDWF. Numerous environmental planning meetings have been held on a regular basis throughout the study process. As documented throughout this document, interagency coordination has occurred regularly and will continue to occur.

9.3 U.S. Fish and Wildlife Service Coordination

A scope of work and funding was provided to the USFWS, Lafayette Field office so that office could assist with the development of alternatives, become an active participant in PDT and HET meetings, participate in site visits, and assist with habitat assessments. The USFWS provided a Final Coordination Act Report. The CEMVN responses to the CAR recommendations are provided in Section 8.3 and the USFWS letter and Final CAR is provided in Appendix B.

9.4 Stakeholder and Outreach Efforts

The Terrebonne Levee and Conservation District (TLCD) hosted a Public Meetings on September 10, 2009. Members of the Morganza to the Gulf PDT participated in the meeting. The meetings were advertised in the Houma Courier and on the Terrebonne Parish website. Flyers were posted in local businesses (grocery store, marina, gas station/convenience store), and distributed to all students at the Paointe Aux Chenes Elementary School where the meetingwas held. The meeting was attended by more than a 100 participants (Standing Room Only). Notable among the participants were Chief Albert White Buffalo Naquin, Isle de Jean Charles Band of Biloxi-Chitimacha-Chocktaw tribe. An article on the meeting appeared in the Houma Courier on September 11, 2009.

A Stakeholder Meeting was held with Colonel Lee on March 5, 2010 at the Terrebonne Parish Consolidated Government Conference Room in Houma, LA to discuss the status of the

Morganza to the Gulf Study. Attendees specifically invited by the Parish President's Office included two representatives from Isle de Jean Charles Band of Biloxi-Chitimacha-Choctaw tribe, Senator Butch Gautreaux, State Representatives Damon Baldone, Norby Chabert, Gordon Dove and Joe Harrison, Councilwoman Arlanda Williams and Councilman Kevin Voisin

The Terrebonne Levee and Conservation District hosted a public Board Meeting on May 10, 2011 to present and discuss the status of the Morganza to the Gulf Study. The meeting was held at the TLCD Offices in Houma, LA. The meeting notifications were advertised in Houma Courier and on Terrebonne Parish website. The meeting was attended by more than a 40 participants. An article on the meeting appeared in the Houma Courier on May 11, 2010 and the Tri-Parish Times on May 25, 2010. .

The Kiwanis Club of Houma hosted a public meeting with presentation on Morganza to the Gulf Study on June 18, 2012. The meeting was advertised on the Kiwanis Club website and was attended by approximately 60 participants. An article on the meeting appeared in the Houma Courier on June 11, 2012.

A public meeting was hosted by the Society of American Military Engineers on September 19, 2012 to hear a presentation on the study. The meeting was held in Metarier, LA and was attended by approximately 50 participants.

The Study was also discussed on several Missippi River Commission High Water/Low Water Inspections as noted below:

April 3, 2009, Baton Rouge, LA
August 20, 2009, Morgan City, LA
16 APRIL 2010, Baton Rouge, LA
August 20, 2010, Houma, LA
April 15, 2011, New Orleans, LA
August 19, 2011, Morgan City, LA
March 30, 2012, New Orleans, LA
August 24,2012, Houma, LA

The public was invited to participate in the District Engineer's briefings on the status of ongoing projects which included presentations on the Morganza to the Gulf Study. New releases announcing the meetings were issued by the Mississippi Valley Division. All the meetings are documented in reports and are available at http://www.mvd.usace.army.mil/About/MississippiRiverCommission(MRC)/MRCPublicProcess.aspx

9.5 Public Review

A 45-day public comment period for the Draft PEIS (DPEIS) occurred from November 13, 2001 to February 21, 2002. A public meeting was held during the public comment period on

December 12, 2001, in Houma, Louisiana. USACE Public affairs office sent the New Release to 275 media outlets. This list is available upon request. The comments, responses, and a transcript of the public meeting can be found in Volume IV of the 2002 Morganza to the Gulf FPEIS, available online http://1.usa.gov/ZVel3A.

A Notice of Availability announcing the release of the draft RPEIS for public review and comment for 45-calendar days through February 19, 2013 was published in the *Federal Register* on January 4, 2013. A Notice of Availability letter was mailed to the CEMVN District stakeholder and NEPA mailing lists also on January 4, 2013. This notice provided a description of the proposed action including the project features, points of contact to obtain more information regarding the Draft RPEIS, and a means of commenting on the Draft RPEIS and companion PAC Report.

A public meeting was held in Houma, LA on January 31, 2013. Public Meeting notices were published in advance of the meeting in local newspapers including *The Times-Picayune and The Houma Courier*. The Public meeting was scheduled as an opportunity for the public, resources agencies, and elected officials to participate in the NEPA planning process, to provide input regarding the proposed alternatives, and to provide comments on the Draft RPEIS and PAC report.

Verbal comments received at the Public Hearings were made part of the Public Meeting transcript and were included within the comment database. During the comment period, approximately 473 comments were received via email, letter, and/or fax.

The following Federal, State, and local agencies as well as NGOs provided comments on the Draft PAC/RPEIS:

- Coastal Protection and Restoration Agency
- Terrebonne Levee and Conservation District
- United States Environmental Protection Agency (USEPA)
- United States Fish and Wildlife Service (USFWS).
- National Marine Fisheries Service (NMFS)
- Natural Resources Conservation Service (NRCS) State Conservationist in Alexandria, LA and Assistant State Conservationist in Lafayette, LA
- Louisiana Department of Environmental Quality (LDEQ)
- Louisiana Department of Natural Resources (LDNR)
- Louisiana Department of Wildlife and Fisheries (LDWF)
- National Wildlife Federation
- Lafourche Parish Council
- Gulf Intracoastal Canal Association (GICA)

- Louisiana Environmental Action Network (LEAN)
- Louisiana Audubon Council
- Gulf Restoration Network
- Atchafalaya Basinkeeper
- Delta Chapter, Sierra Club

As comments were received, each was read and entered into a database. Names, organizations, and emails were all entered. Comments were identified under "major themes" to gain an understanding of key issues. The most common concern in the top 10 comment themes (representing over 50 percent of the comments) are the potential environmental impacts of the project and associated mitigation requirements. Federal and State agencies noted that in the future there is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation assuming there would be increased frequency and duration of water control structure closures as sea level rise accelerates. In response to these concerns, the Final PAC/RPEIS includes a quantitative analysis of the range of potential indirect impacts, including a mitigation plan, for the constructible features, and a qualitative analysis of the potential impacts for the entire project.

The remaining 9 of the top 10 comment themes (from most common to least common with each theme representing less than 10 percent of the total comments) were related to communication, coordination, and consideration of socioeconomic/cultural impacts; plan realignment or reformulation; design standards, RSLR, & constructability; project economics; nonstructural measures; the relationship of Morganza to other plans or projects, such as the State Master Plan and Louisiana Coastal Area (LCA) projects; GIWW floodgate size change, modeling, and impacts; non-Federal contributions; and general support for the project.

Appendix E summarizes the comments received during the comment period and the responses to comments for recurring comment themes.

9.6 Final Revised Programmatic Environmental Impact Statement

The Final RPEIS has been updated to include refinements in the proposed action and where applicable, comments received on the Draft RPEIS have been incorporated into the Final RPEIS. The FEIS would be made available for public review and comment. A Notice of Availability (NOA) would be published in the *Federal Register* on May 24, 2013, to inform the public that the Final RPEIS has been released. A 30-day comment period would follow the NOA to provide interested parties with an additional opportunity to review and comment upon the FEIS.

9.7 Record of Decision (ROD)

A Draft ROD is being released along with the Final RPEIS and is subject to change upon receipt of comments on the final report (Appendix M).

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11. INDEX

12. ACRONYMS

AAHU	Average Annual Habitat Unit
AEP	Annual Exceedance Probability
ANTM	Atchafalaya to Northern Terrebonne Marshes
AQCR	Air Quality Control Region
AQI	Air Quality Index
BA	Biological Assessment
CEMVN	Corps of Engineers, New Orleans District
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Cfs	Cubic Feet Per Second
CIAP	Coastal Impact Assistance Program
CPRAB	Louisiana Coastal Protection and Restoration Authority Board
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
DNR	Louisiana Department of Natural Resources
DOTD	Louisiana Department of Transportation and Development
DPEIS	Draft Programmatic Environmental Impact Statement
EC	Engineering Circular
EO	Executive Order
EFH	Essential Fish Habitat
ER	Engineering Regulation
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FPEIS	Final Programmatic Environmental Impact Statement
FWCA	Fish and Wildlife Coordination Act
GIWW	Gulf Intracoastal Waterway
GMFMC	Gulf of Mexico Fisher Management Council
HNC	Houma Navigation Canal
HTRW	Hazardous, Toxic, and Radioactive Waste
IPCC	Intergovernmental Panel on Climate Change
LCA	Louisiana Coastal Area
LDWF	Louisiana Department of Wildlife and Fisheries
NAAQS	National Ambient Air Quality Standards
NBEM	National Bald Eagle Management
NED	National Economic Development
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
OMRR&R	Operation, Maintenance, Repair, Rehabilitation and Replacement
PAC	Post Authorization Change report
PED	Pre-Construction, Engineering and Design

PL	Public Law
PPA	Project Partnership Agreement
ppt	Parts-Per-Thousand
REC	Recognized Environmental Condition
ROD	Record of Decision
RDPEIS	Revised Draft Programmatic Environmental Impact Statement
RP	Recommended Plan
RPEIS	Revised Programmatic Environmental Impact Statement
RSLR	Relative Sea Level Rise
SAV	Submerged Aquatic Vegetation
TLCD	Terrebonne Levee and Conservation District
TSP	Tentatively Selected Plan
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WVA	Wetland Value Assessment

Appendix A

BIOLOGICAL ASSESSMENT

Morganza to the Gulf of Mexico Risk Reduction Project
Biological Assessment (BA)
Errata Sheet
Updated March 21, 2013

It is the USACE determination that there will be No Affect to Threatened or Endangered Species or their Critical habitat due to the Morganza to the Gulf Risk Reduction Project .

Errors found in body of BA

The project area has also changed since the preparation of this BA (RPEIS figure 1-1). Originally, offshore sediment was being considered as a borrow source. Offshore sediment is no longer being considered. Due to the elimination of offshore sediment, the project area has changed in the fact that it does not extend as far south. There is potential for some areas referenced in this BA to no longer be within the project area. Please reference the RPEIS for an updated project area and description.

BA Pages 1, 6, 7: The bald eagle and brown pelican have been delisted as threatened and/or endangered. Although still protected under the Migratory Bird Treaty Act (MBTA), and still known to be present in the project area, these species are no longer protected under the Endangered Species Act (ESA). Therefore, the bald eagle and brown pelican sections of this BA can be disregarded.

BA Pages 1, 7, 8: Due to the elimination of offshore sediment use, whales are extremely unlikely to exist within the revised project area (RPEIS figure 1-1). Typically, no threatened or endangered species of whales occur in the nearshore waters of the Gulf of Mexico with the exception of the occasional sighting of right whales and humpback whales. However, these sightings are extremely rare.
http://www.offshoreoperators.com/marinedebris/Protected-Species-In-GOM-NOAA.pdf

Environmental Supporting Documentation

C-1	C-2	C-3	C-4	C-5	C-6
Environmental Data Collection and Analyses	Cost Effectiveness and Incremental Analyses of Mitigation Plans (for Federal Project)	Statistical Comparison of Land Loss in the Subbasins: Wetland Loss Analysis for a Deltaic Area in Coastal Louisiana	Threatened and Endangered Species Biological Assessment (for Federal and applicant projects)	Cultural Resources: State Historic Preservation Officer Correspondence	Fish and Wildlife Coordination Act Report (for Federal project)

This assessment addresses threatened and endangered species that could be affected by the alternatives to provide hurricane protection for Terrebonne and Lafourche Parishes. In response to a Corps' March 19, 1996 request, the National Marine Fisheries Service (NMFS) listed the threatened Gulf sturgeon and five species of endangered or threatened sea turtles [green (threatened), Kemp's ridley (endangered), hawksbill (endangered), leatherback (endangered), and loggerhead (threatened)] that occur in the northern Gulf near the study area. Four species of baleen whales (northern right, sei, finback, and humpback) and one species of toothed whale (sperm whale) are also listed by NMFS as possibly in the Gulf of Mexico near the study area. All are currently listed as endangered. There is no proposed or designated critical habitat for these species in Louisiana. The Fish and Wildlife Service (FWS) noted the bald eagle (threatened), brown pelican (endangered), piping plover (threatened), and Kemp's ridley sea turtle (endangered) as possibly being in or near the study area and under their responsibility. On July 10, 2001, FWS designated critical habitat for the piping plover within the extreme southern portions of the study area. No other critical habitat has been designated in the project area by FWS or NMFS.

The American alligator is listed as threatened due to similarity of appearance. This species is found in waterbodies throughout the fresh to brackish portions of the study area. Louisiana has implemented a commercial harvest season for alligator as its population has risen well above a level of concern. None of the action alternatives would have adverse impacts to the alligator population. Therefore, alligator will not be discussed further in this Biological Assessment.

All the whale species are uncommon to rare in the Gulf of Mexico except for the sperm whale (Burkardt 1996; DOI 1994), which is found in deeper waters and are not likely to be affected, even indirectly, by any of the alternatives studied in detail.

The assessment on sea turtles relies heavily on information from the 1995 Biological Assessment: Impacts of Navigation Channel Hopper Dredging on Threatened and Endangered Species in Louisiana (Baird 1995). Information on sea turtles along coastal Louisiana is generally sparse. Historical and recent occurrences of the Kemp's ridley, loggerhead, green, leatherback, and hawksbill turtles in the vicinity of the three coastal Louisiana channels is summarized, and the potential impacts are discussed.

PROJECT DESCRIPTIONS

The Corps of Engineers, New Orleans District (Corps) and the Terrebonne Levee and Conservation District (formerly South Terrebonne Tidewater Management and Conservation District, STTMCD) have formulated potential plans for the purpose of hurricane protection for areas of Terrebonne and Lafourche Parishes Louisiana. The strategy for an overall hurricane protection system for Terrebonne Parish was to provide flood control and wetlands protection at the same time. The plan envisions as its primary feature, a levee/flood wall, from the western side of Terrebonne Parish, traversing the southern portion of the parish and connecting with the south Lafourche hurricane protection system at Larose. The Feasibility Report/EIS provides details on these plans.

GENERAL BIOLOGY

GULF STURGEON (*Acipenser oxyrinchus desotoi*)

The Gulf sturgeon has been a recognized subspecies of the Atlantic sturgeon since 1985 and inhabits the Atlantic and Pacific oceans and certain freshwaters of the United States. According to Barkuloo (1988) this fish is found in most major river systems from the Mississippi River to the Suwannee River that connect to the Gulf of Mexico and in the central and eastern Gulf of Mexico. They are found mostly in the eastern rivers of the Gulf of Mexico near Florida. Particularly important are the Apalachicola and Suwannee Rivers in Florida.

Gulf sturgeon is an anadramous species, laying eggs in freshwater, moving to the Gulf of Mexico at 3-4 years of age during the fall and winter, and returning to freshwater each spring as river temperatures rise to 16 to 23 C. Wooley and Crateau (1985) found Gulf sturgeon in the Apalachicola River downstream from Jim Woodruff Lock and Dam (river km 171) from May through September. They seemed to concentrate in a large scour hole below the lock, moving very little from the area. The area consisted of sand and gravel substrate, with water depths of 6.0 to 12.0 meters and velocities of 0.6 to 0.9 meters/second. The fish begin to migrate back to estuaries when river temperatures dip below 23 C Wooley and Crateau (1985).

Food of the Gulf sturgeon consists primarily of crab, amphipods, annelids, lancelets, and, brachiopods (Mason and Clugston 1993). However, they do not eat once they enter the rivers in the spring. It remains unclear why most subadult and adult Gulf sturgeon feed in the marine environment for a relatively short time and enter freshwater where they do not feed (USFWS and Gulf States Marine Fisheries Commission 1995).

The Gulf sturgeon can easily attain length over 2 m and live nearly 30 years. Huff (1975) found that mature females ranged in age from 8-17 years and that mature males ranged from 7 to 21 years. Chapman found that mature Gulf sturgeon produce an average of 403,000 eggs. Eggs are demersal and adhesive. Timing, location, and habitat requirements for Gulf sturgeon spawning are not well documented.

The Gulf sturgeon was virtually extirpated throughout its range at the turn of the 20th century. Overexploitation, damming of rivers and other forms of habitat destruction, incidental catch, and water quality deterioration are listed as some of the causes of their decline (Huff 1975; Barkuloo 1988; McDowall 1988; and Birstein 1993).

KEMP'S RIDLEY SEA TURTLE (*Lepidochelys kempi*)

Almost all Kemp's ridley nesting occurs on a single beach at Rancho Nuevo, Mexico, about 30 kilometers south of the Rio Grande. There is some sporadic nesting along the Texas coast. Females arrive in small aggregations known as arribadas from mid-April through August (Rabalais and Rabalais 1980). Based on returns of females tagged on the nesting beach, most adult ridleys move to major foraging grounds to the south in the Campeche-Tabasco region and some move to the northern Gulf of Mexico (Chavez 1969). Members of this genus are usually found in water with low salinity, high turbidity, high organic content, and where shrimp are abundant (Zwinenberg 1977). Such conditions occur where major rivers enter the Gulf.

Stomach analysis of specimens collected in shrimp trawls off Louisiana includes crabs(*Callinectes*), gastropods (*Nassarius*), and clams (*Nuculana*, *Corbula*, and probably *Mulinia*), as well as mud balls, indicating feeding near a mud bottom in an estuarine or bay area (Dobie et al. 1961). Although considered primarily carnivorous benthic feeders (Ernst and Barbour 1972), jellyfish have also been reported as part of their diet (Fritts et al. 1983). Presence of fish such as croaker and spotted seatrout in the gut of stranded individuals in Texas may suggest that turtles feed on the bycatch of shrimp trawlers (Landry 1986).

Precise data regarding the total number of Kemp's ridleys occurring in the Gulf of Mexico are not available. Trends in turtle populations are identified through monitoring of their most accessible life stages on the nesting beaches, where hatchling production and the status of adult females can be directly measured. Population declines of the ridley have been attributed to egg stealing on the localized nesting beach, capture of diurnal nesting females, and fishing and accidental capture in shrimp trawls (Fuller 1978; Pritchard and Marquez 1973).

Film taken in 1947 documented over 40,000 nesting females in a single day during an arribada at Rancho Nuevo (Carr 1963). Bi-national protection and monitoring by Mexico and the United States has occurred on the nesting beach since 1978. Arribadas of up to 200 females have rarely been observed since the beginning of monitoring (U.S. Fish and Wildlife Service [USFWS] and NMFS 1992). Nest production plummeted to only 702 nests in 1985, but has been steadily increasing since that time (Byles, pers. comm.). Over 1,500 nests were observed during the 1994-nesting season, representing the highest nesting year since monitoring was initiated. While these data need to be interpreted cautiously due to expanded monitoring efforts since 1990, an estimated 107,687 hatchlings were released from Rancho Nuevo in 1994, compared to 45,000 to 80,000 from 1987 through 1991 (Byles, pers. comm.). In 1998, there were over 3,700 nests and 183,000 hatchlings; the number of nest declined slightly in 1999 with only 3,600, but hatchlings set a new record with over 225,000 (LSUCES 1999; LSUCES 2000).

Documented evidence and anecdotal accounts suggest a recent upward trend in the Kemp's ridley population. However, the Recovery Plan for the Kemp's ridley sea turtle (*Lepidochelys kempi*) (USFWS and NMFS, 1992) has identified a recovery criteria of 10,000 nesting females in one season as a prerequisite for a determination that Kemp's ridleys can be downlisted to a threatened status. Considering 58 percent of all adult females appear to nest in any one year, and each female lays an estimated 2.7 nests, 1,500 nests documented in 1994 represents less than 1,000 adult female Kemp's ridleys in the entire population. This is less than 2.5 percent of nesting females observed in one day in 1947, and only 5 percent of the downlisting criterion identified in the Recovery Plan.

LOGGERHEAD SEA TURTLE (*Caretta caretta*)

The loggerhead is found in temperate and subtropical waters worldwide. The principal nesting range of the loggerhead is from Cape Lookout, North Carolina, to Mexico. The majority (90 percent) of the reproductive effort in the coastal United States occurs along the south-central east coast of Florida (Hildebrand 1981). Nesting in the northern Gulf outside of Florida occurs primarily on the Chandeleur Islands and to a lesser extent on adjacent Ship, Horn, and Petit Bois Islands in

Mississippi and Alabama (Ogren 1977). Loggerhead eggs were collected from Grand Isle, Louisiana, 50 years ago (Hildebrand 1981). Ogren (1977) reported a historical reproductive assemblage of sea turtles, which nested seasonally on remote barrier beaches of eastern Louisiana, Mississippi, and Alabama. This included Bird, Breton, and Chandeleur Islands in Louisiana.

Loss or degradation of suitable nesting habitat may be the most important factor affecting the nesting population in Louisiana (Ogren 1977). Overall loss of nesting beaches, hatchling disorientation from artificial light, drowning in fishing and shrimping trawls, marine pollution, and plastics and Styrofoam have led to the decline of loggerheads.

Loggerhead turtles are considered turtles of shallow water, less than 50 meters deep (Rabalais and Rabalais 1980). Juvenile loggerheads are thought to utilize bays and estuaries for feeding, while adults prefer waters less than 50 meters deep (Nelson 1986). During aerial surveys of the Gulf of Mexico, the majority (97 percent) of loggerheads were seen off the east and west coasts of Florida (Fritts 1983). Most were observed around mid-day near the surface, possibly related to surface basking behavior (Nelson 1986). Although loggerheads were seen off the coast of Louisiana and Texas, they were 50 times more abundant in Florida than in the western Gulf. The majority of the sightings were in the summer (Fritts et al. 1983). Loggerheads migrate west along with shallow coastal waters, as indicated by telemetry data from an individual tagged in the Mississippi Delta moving to Corpus Christi (Solt 1981).

Loggerheads are frequently observed near offshore oil platforms, natural rock reefs, and rock jetties in Texas. Large numbers of stranded turtles were observed inshore of such areas (Rabalais and Rabalais 1980). Oyster fishermen have reported large turtles near oyster reefs in Louisiana. In a recent tracking study, loggerheads spent more than 90 percent of the time underwater, tended to avoid colder water, and spent much of the time in the vicinity of oil and gas structures (Renaud and Carpenter, in preparation).

Food of loggerheads consists of mollusks, crabs, shrimp, sea urchins, sponges, squid, basket stars, jellyfish, and even mangrove leaves in the shallows (Caldwell et al. 1955; Hendrickson 1980; Nelson 1986). Presence of fish species such as croaker in stomachs of stranded individuals may indicate feeding on the by-catch of shrimp trawling (Landry 1986). They appear to be well adapted for feeding on mollusks with a heavy jaw and head (Hendrickson 1980). Caldwell et al. (1955) suggest that the willingness of the loggerhead to consume any type of invertebrate food permits its range to be limited only by the presence of cold water. In shallow Florida lagoons, loggerheads were found during the morning and evening, leaving the area during mid-day when temperatures reached 31 C. At dusk, turtles moved to a sleeping site and remained there until morning, possibly in response to changes in light or water temperature (Nelson 1986).

GREEN SEA TURTLE (*Chelonia mydas*)

The green turtle has worldwide distribution, concentrated primarily between 35^{o} North and 35^{o} South latitude. Green turtles tend to occur in waters that remain warmer than 20 C; however, there is evidence that they may be buried under mud in a torpid state in waters to 10 C (Ehrhart 1977; Carr et al. 1979). This species migrates between feeding and nesting areas, often over long distances (Carr and Hirth 1962). It is a large sea turtle with carapace length in adults commonly reaching one meter (NMFS and USFWS 1991).

In the United States' Atlantic waters, green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida. Estimates of age at sexual maturity range from 20 to 50 years (Balazs 1982; Frazer and Ehrhart 1985) and they may live over 100 years Zug et al. (1986).

During their first year of life, green sea turtles are thought to feed mainly on invertebrates, with adults preferring an herbivorous diet and frequenting shallow water flats for feeding (Fritts et al. 1983). The adult turtle feeds primarily on seagrasses (i.e., *Thalassia testudinum* and turtle grass), which have a high fiber content and low forage quality (Bjorndal 1981a) and algae (Bjorndal 1985). The Caribbean green turtle is considered by Bjorndal (l981b) to be nutrient-limited, resulting in low growth rate, delayed sexual maturity, and low annual reproductive effort. This low reproductive effort makes recovery of the species slow once the adult population numbers have been severely reduced (Bjorndal 1981). In the Gulf of Mexico, principal "feeding pastures" are located in the upper west coast of Florida (Hirth 1971). Nocturnal resting sites may be a considerable distance from feeding areas, and distribution of the species is generally correlated with grassbed distribution, location of resting beaches, and possibly ocean currents (Hirth 1971).

Immediately after hatching, green turtles swim past the surf and other shoreline obstructions, primarily at depths of 20 centimeters or less below the water surface, and are dispersed both by vigorous swimming and surface currents (Frick 1976; Balzas 1980). The whereabouts of hatchlings to juvenile size (35 centimeters) is uncertain. In the Hawaiian Archipelago, juveniles greater than 35 centimeters in length, as well as subadults, feed and rest in shallower coastal areas than adults. Hawaiian adult and immature turtles come inshore at certain undisturbed sites to bask or rest (Balzas 1980). Green turtles tracked in Texas waters spent more time on the surface, with fewer submergences at night than during the day, and a very small percentage of the time was spent in the Federally maintained navigation channels. The tracked turtles tended to utilize jetties, particularly outside of them, for foraging habitat (Renaud et. al. 1993).

Most green turtle populations have been depleted or endangered because of direct exploitation or incidental drowning in trawl nets (King 1981). Defunct green turtle fisheries in Louisiana and Texas indicate it was more common in areas where it is now rare (Rebel 1974, in Fritts et al. 1983). In Texas in the 1800's, the green turtle fishery was the first to appear and disappear. Animals were captured from April to November, primarily when they were returning to diurnal feeding areas from nocturnal resting places in deeper waters of bays (Hildebrand 1981). Green turtles in Texas still inhabit the same seagrass meadows as at the turn of the century, although in reduced numbers (Hildebrand 1981). In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation (King 1981).

LEATHERBACK SEA TURTLE (*Dermochelys coriacea*)

The leatherback is the largest sea turtle and is highly migratory, is the most pelagic of all sea turtles (NMFS and USFWS 1992), and is commonly occurring in continental shelf waters (Pritchard 1971; Hirth 1980; Fritts et al. 1983). It is a temperate zone form with a tropical nesting range (Ross 1981). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al. 1983). General decline of this species is attributed to exploitation of eggs (Ross 1981).

Nesting of leatherback turtles is nocturnal with nesting in the United States in the Gulf of Mexico (Florida) from April to late July (Pritchard 1971; Fuller 1978; Fritts et al. 1983). The Pacific coast of Mexico supports the worlds largest known concentration of nesting leatherbacks. There is very little nesting in the United States and no nesting has been reported from Louisiana (Gunter 1981). A small number nest on the west coast of Florida from April to late July (Pritchard 1971; Fulller 1978; Fritts 1983).

Leatherback turtles feed primarily on jellyfish and other coelenterates. They will also ingest plastic bags and other plastic debris, which is commonly generated by oil drilling rigs and production platforms in coastal Louisiana (Fritts et al. 1983).

HAWKSBILL SEA TURTLE (*Eretmochelys imbricata*)

The hawksbill turtle is the second smallest sea turtle being somewhat larger than the Kemp's ridley. Nesting females average about 87 cm in curved carapace length (Eckert 1992). The adults are easily recognized by their thick carapace scutes, usually with radiating brown and black streaks on an amber background, and a jagged posterior margin on the carapace. The name of the turtle is derived from the tapered beak and narrow head.

These turtles generally live most of their life in tropical waters such as the warmer parts of the Atlantic Ocean, Gulf of Mexico and the Caribbean Sea (Carr 1952 and Witzell 1983). Florida and Texas are the only states where hawksbills are sighted with any regularity (NMFS and USFWS 1993). They are extremely rare in Louisiana waters.

Hawksbills nest throughout their range, but most of the nesting occurs on restricted beaches, to which they return each time they nest. The hawksbill breeds and nests in a diffuse rather than colonial nesting pattern in warm waters between 25^{o} North and 25^{o} South latitude (Rebel 1974). These turtles are some of the most solitary nesters of all the sea turtles. Depending on location, nesting may occur from April through November (Fuller et al. 1987). These turtles prefer to nest on clean beaches with greater oceanic exposure than those preferred by green sea turtles, although they are often found together on the same beach. The nesting sites are usually on beaches with a fine gravel texture. Hawksbills have been found in a variety of beach habitats ranging from pocket beaches only several yards wide formed between rock crevices to a low-energy sand beach with woody vegetation near the waterline. These turtles tend to use nesting sites where vegetation is close to the waters edge. They do not nest in Louisiana.

Mating takes place offshore near the nesting sites. Males rarely come ashore. Mature females come to shore at night to prepare nests at the upper part of the beach. Females nest several times a season and have up to 200 eggs per clutch (NMFS and USFWS 1993). Each female may not reproduce every year. Young turtles dig out of nests and go to sea in search of food. Large numbers of young are normally lost to predation. Since the juvenile mortality rate is high, rapid growth and adult longevity tend to make most turtle populations consist of mainly larger turtles.

Juvenile hawksbills are normally found in waters less than 15 meters in depth. Areas around coral reefs, shoals, lagoons, lagoon channels and bays with marine vegetation that provides both protection and plant and animal food. The hawksbill can tolerate muddy bottoms with sparse vegetation unlike the green turtles.

The hawksbill was once thought to be a generalist or opportunistic feeder but studies now indicate that the primary food source is comprised of sponges and other encrusting organisms. Other organisms found in the diet are now believed to be incidental organisms living in association with the sponges which are being used for food (Meylan 1988). Adults forage around reefs up to 100 meters in depth and are not usually in shallow waters less than 20 meters in depth. Juveniles forage in shallow waters near the shallowest coral reefs. Offshore behavior of the turtles is not well understood. Both single and mated pairs of adult turtles and juveniles as well have been observed in all seasons in the Caribbean. It is thought they are foraging on the live bottom sponges in the area.

The hawksbill is probably a diurnal species and only feeds in daylight in captivity. These turtles go through a pelagic feeding phase as hatchlings and are normally associated with seaweed mats. During this phase the juveniles feed on the shallow reefs until they reach a length of 15-25 centimeters. As the turtles mature, they move from pelagic feeders to benthic feeders. With this change in feeding habits the foraging territory is moved further and further from shore to the deeper waters as the turtle improves its capability for deep dives.

SEA TURTLES IN THE GULF OF MEXICO
Inshore areas of the Gulf of Mexico appear to be important habitats for the Kemp's ridley. Members of this genus are characteristically found in waters of low salinity, high turbidity, high organic content, and where shrimp are abundant (Zwinenberg 1977, Hughes 1972). Adults tagged at Rancho Nuevo were recaptured off coastal Louisiana and in Vermilion Bay, and animals have been reported from Vermilion Parish to Terrebonne Parish (Pritchard and Marquez 1973; Chavez 1969; Keiser 1976; Zwinenberg 1977; Dobie et al. 1961). Ridleys are commonly captured by shrimpers off the Texas coast and in heavily trawled areas of the Louisiana and Alabama coast (Pritchard and Marquez 1973; Carr 1980).

Kemp's ridley has been labeled the "Louisiana turtle" by Hildebrand (1981) and is thought to be the most abundant turtle off the Louisiana coast (Viosca 1961; Gunter 1981). The highly productive white shrimp-portunid crab beds of Louisiana from Marsh Island to the Mississippi Delta, south of the study area are thought to be the major feeding grounds for subadult and adult ridley (Hildebrand 1981). The current patterns in the Gulf of Mexico could aid in transport of individuals, where small turtles would enter the major clockwise loop current of the western Gulf of Mexico, carrying individuals north and east along Texas, Louisiana, and other northern Gulf areas (Pritchard and Marquez 1973; Hildebrand 1981).

Beginning in April 1994, unprecedented numbers of dead sea turtles beached along the coasts of Louisiana and Texas. During 1994, a total of 174 turtles, including 134 Kemp's ridleys, stranded in Louisiana. An additional 488 turtles stranded on offshore Texas beaches during 1994, including almost 243 Kemp's ridley turtles and 190 loggerheads. The apparent cause of most of the strandings was the simultaneous occurrence of an intensive pulse of shrimping in an area of high Kemp's ridley abundance during 1994. Information regarding whether the abundance of sea turtles in the northern Gulf was a seasonal anomaly, or represents the current status of sea turtles in nearshore waters, is not available. The Louisiana Sea Turtle Stranding and Salvage Network (LA-STSSN) registered 373 sea turtles stranded on Louisiana beaches from 1990 through 1994. Of these, 268 were Kemp's ridleys, and 41 were unidentified (Koike 1995).

Stomach content analyses on sea turtles stranded in Texas suggest that, in all years, most mortalities occur in nearshore waters. Stomach contents of Kemp's ridleys along the lower Texas coast also showed a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be shrimp fishery discards (Shaver 1991). Over 150 Kemp's ridleys have been intentionally live-captured by research gillnets in 1993 and 1994 at Sabine Pass by Texas A&M University scientists conducting research for the Corps of Engineers. This illustrates the availability of ridleys to human interactions in north Texas waters.

Findings of ongoing research conducted by NMFS scientists support the likelihood that the nearshore waters of Texas and Louisiana provide important developmental habitat for young loggerheads and Kemp's ridley sea turtles. Ogren (1988) suggests that the Gulf Coast from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. One hundred and thirty turtles have been tracked by NMFS Galveston Lab staff since 1980, including 91 ridleys tracked since September 1988 with Corps support. Preliminary analysis of data collected suggests that subadult Kemp's ridleys occupy shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida Coast (Renaud, pers. comm.) Juvenile ridleys are usually found in waters of 9 meters or less, and all ridleys are generally found in water depths less than 18 meters (Renaud, draft in-house report transmitted December 8, 1994).

In addition to the NMFS studies, satellite transmitters have been applied to approximately 50 adult female Kemp's ridleys over the last decade to identify the movements of the females after leaving the nesting beach in Rancho Nuevo, Mexico (Byles, unpublished data). While most female ridleys head south towards the Bay of Campeche after leaving the beach, two out of eight turtles headed into nearshore Texas waters during one year's study. In 1994, of four turtles that were tagged, three went south and one went as far north as the vicinity of the mouth of the Mississippi River (Byles, pers. comm.) Clearly, reproductively active Kemp's ridleys, which are directly required for the recovery of the population, are found within the U.S. Gulf of Mexico, and are as vulnerable to human impacts as sub-adults.

Loggerhead turtle strandings have been reported in Louisiana from Cameron (Fuller 1986) as well as Holly Beach in August, and Isles Dernieres in July (SEAN 1980). A tagged loggerhead was recaptured near Grand Isle at Belle Pass (Lund 1974). More recently, LA-STSSN registered 45 loggerheads stranded on Louisiana beaches from 1990 through 1994. This represented 12 percent of the sea turtles stranded, second only to the Kemp's ridley.

Studies conducted on loggerheads stranded on the lower Texas coast (south of Matagorda Island) have indicated that stranded individuals were feeding in nearshore waters shortly before their death (Plotkin et al. 1993). Recent capture and telemetry studies of sea turtle movements along the northern Gulf of Mexico showed usage of the nearshore areas near jetties and channels. Kemp's ridleys were captured most frequently, and loggerheads were the second most frequently captured in Texas and Louisiana waters.

Historical sightings of green turtles by fishermen in Louisiana occurred gulfward of Isles Dernieres and Timbalier Islands in spring, summer, and fall. Recent sightings have been reported from the northwest areas of Terrebonne Bay in summer and off Belle Pass in fall (Fuller 1986). A green turtle also has been reported from the Chandeleur Islands (Viosca 1961). A green turtle was found in June on Grand Terre near Fort Livingston (SEAN 1980). No green turtles were observed during an aerial survey in Louisiana or Texas in 1979, possibly due to low abundance as well as identification problems. Green turtle stranding records, and turtle fishing records from Louisiana and Texas combined, are one-third that reported from Florida (Fritts et al. 1983). LA-STSSN registered 10 green turtles stranded on Louisiana beaches from 1990 through 1994. This represented 2.7 percent of the sea turtles stranded.

Historical sightings of leatherback turtles have been reported in Louisiana from Terrebonne Bay and Timbalier Bay. Sightings were noted by helicopter pilots in National Marine Fisheries Service statistical zones 12, 14 and 17 in January, March, and April (Fuller 1986). These zones include the area off Isles Dernieres and Timbalier Islands (Area 14) and off Cameron (Area 17). Leatherback turtles have been reported in aerial surveys off Marsh Island in April. They were observed in waters of a depth of 20 meters and 330 meters, approximately 55 and 190 kilometers from shore, respectively (Fritts et al. 1983). Low numbers of leatherback turtles reported by fishermen in coastal Louisiana may reflect low numbers in the area, or lack of fishing in areas where the species would occur (Fuller 1986). Only eight leatherbacks were stranded on Louisiana beaches from 1990 through 1994.

While there have been no sightings of hawksbill turtles in the proposed area of work, one was reported from a gillnet catch in Cameron Parish, Louisiana, in the 1986 survey of Louisiana coastal waters by the National Marine Fisheries Survey (Fuller et al. 1987). This supports the general belief that hawksbills are scarce in Louisiana waters. The stranding network data from 1990 through 1994 reported only one hawksbill stranding in Louisiana.

The LA-STSSN data (1990-1994) shows that of the reported 373 turtles stranded in Louisiana, approximately 60 percent were in Cameron Parish and 26 percent were in Jefferson Parish. Strandings in Lafourche Parish were somewhat frequent (eight percent), but the number of strandings in Terrebonne Parish was low (one percent). It should be noted that because of differences in beach access and coastline irregularities, reports are likely to reflect these influences.

PIPING PLOVER (*Charadrius melodus*)

Piping plovers breed in northern latitudes in three geographic regions and winter along the south Atlantic and Gulf coasts, including coastal Louisiana. Overwintering populations in Louisiana occur on beaches, sandflats, and dunes in Cameron Parish in the west and Jefferson Parish (Grand Terre Island and Grand Isle) in the east in 1987 (USFWS 1988). Numbers are highly variable, based on recent census data provided by Steve Shively of the Louisiana Department of Wildlife and Fisheries. They do occur on the Isle Dernieres barrier island chain in Terrebonne Parish. Historically, piping plovers also have been reported from Calcasieu, Vermilion, East Baton Rouge, and Orleans parishes. Not much is known about their nonbreeding habitat.

Piping plovers begin arriving at the northern United States and southern Canada breeding grounds in mid-April (Prindiville 1986). They are known to nest with least tern, arctic terns, and common terns (USFWS 1985; Cairns 1977). They breed in open, sparsely vegetated habitats that are slightly raised in elevation. Egg laying occurs in May with clutch size equaling four and 1-2 chicks fledging at about four weeks old (Haig and Oring 1985). The adults leave nesting grounds in late July-early August, with the uveniles following a few weeks later (Wiens 1986). Birds normally return to the same breeding area (Haig 1987), but occasionally they go to other areas (Haig and Oring 1988).

Primary prey for wintering plover includes polychaete marine worm, various crustaceans, insects, and occasionally bivalve mollusks. Chicks feed on smaller sizes of these same foods shortly after they hatch.

There were just over 2,000 breeding pairs in 1986-1987. This number is not comparable to historical numbers because data is lacking. Piping plovers can apparently live five years or somewhat longer (Wilcox 1957). In 1990 there were an estimated 1,840 breeding pairs (FWS 1991).

Critical habitat has been designated for piping plovers in both their breeding and wintering grounds. Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The primary constituent elements for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering, and the physical features necessary for maintaining the natural processes that support these habitat components. Constituent elements are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide) and associated dune systems and flats above annual high tide. Important components (or primary constituent elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent un-vegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers.

BROWN PELICAN (*Pelecanus occidentalis carolinensis*)

The eastern brown pelican is found along the Atlantic coast from North Carolina to Florida and along the Gulf coast to northern South America; it also ranges along the Pacific coast from southern Mexico to Columbia. It was extirpated from Louisiana in the late 1950's and early 1960's (McNease et al. 1984) primarily because of organochlorine pesticides in the food chain. They were reintroduced into Louisiana from Florida from 1968 to 1980 and nesting populations were established on North Island in the Chandeleur Islands and Queen Bess Island in Barataria Bay, southeast of the study area (Hingtgen et al. 1985). Additional nesting colonies were later established on Isles Dernieres, south of the study area and natural expansion has established colonies on Mississippi River mud lumps, on Grand Gosier Island in the Chandeleur Islands (McNease et al. 1992), and Baptiste Collette. In 1993-1994, about 20,000 fledglings were produced in Louisiana and in 1995 the number rose to 16,000 (LDWF data).

Eastern brown pelicans begin to breed when they are 3 to 5 years old (Blus and Keahey 1978). They live to be about 20 years old (Clapp et al. 1982). They begin nesting in Louisiana during February with eggs normally laid for three months and up to six months. Clutch size is usually three eggs. In Louisiana, about 1.6 young are fledged from each nest (LDWF data). Production of young fledgings requires about 18 weeks (Schreiber 1979). The principal source of eastern brown pelican nesting failure is direct and indirect human interference with nesting colonies (Clapp et al. 1982). Pelicans disperse southward and probably winter south of the United States (Schreiber and Schreiber 1983).

The pelicans forage primarily in shallow estuarine waters (Schreiber 1978) and in ocean waters within 32 km of shore. Food consists mainly of gulf menhaden, mullet, and other species of forage fish (Krantz 1968) normally less than 25 cm. They plunge-dive from heights of up to 20 m to capture prey with their bill and pouch (Schreiber et al. 1975) in the top 1 m of water (Schnell et al. 1983).

BALD EAGLE (*Haliaeetus leucocephalus*)

The bald eagle (*Haliaeetus leucocephalus*) is a raptor that is found in various areas throughout the United States and Canada. Populations experienced drastic declines from the 1940's to the 1970's (Grier 1982), but populations are on the rebound. The ban on the use of DDT in the United States in 1972 resulted in higher productivity nationwide (Peterson 1986). In 1995, the bald eagle was downlisted from an endangered status to a threatened status in most of the lower 48 states, including Louisiana. This species prefers habitat near large rivers, lakes, and estuaries and occurs throughout Louisiana. From 1989 to 1995 the number of nests and number of young produced has been steadily increasing (LDWF data) such that 157 eagles were produced in 1995. There are at least 30 documented (i.e., present and historical) bald eagle nest locations within the study area, all are in the northern portion (where larger trees are found) as would be expected and most are in subbasin A, west of Bayou du Large.

Bald eagles begin nesting in September with the peak egg laying in December. Clutch size ranges from 1-3 eggs and fledging takes 10-12 weeks (Murphy et al. 1989). The birds then tend to move north up to 1,000 miles. The main basis of the bald eagle diet is fish (DeGraff et al. 1980), but they will feed on other items such as birds and carrion depending upon availability of the various foods. Eagles require roosting and nesting habitat, which in Louisiana consists of large trees in fairly open stands (Anthony et al. 1982).

Bald eagles can be disturbed by human activity, including recreation (Boyle and Samson 1985; Stalmaster and Kaiser 1998). McGarigal et al. (1991) found that eagles generally avoid foraging within a 400-meter radius around areas with human boating activities (McGarigal et al. 1991).

FINBACK WHALE (*Balaenoptera physalus*)

The finback whale is the second largest baleen whale. It feeds primarily on krill and small schooling fish. In the western north Atlantic they occur from Greenland south to the Gulf of Mexico and the Caribbean Sea (Leatherwood et al. 1976). They may occur year-round in the Gulf of Mexico; however, no finbacks were sighted during aerial surveys conducted in 1980-1981 (Fritts et al. 1983a).

Finbacks have stranded in the Gulf of Mexico along the coasts of Florida, Louisiana, and Texas. Standing records for Louisiana include Isles Dernieres off Terrebonne Parish in 1915, Pelican Island on the western edge of Breton Sound in 1917, near Sabine Pass in 1924, the Chandeleur Islands in 1928, and in the marsh west of Venice in 1968 (Lowery 1974). A whale that stranded in Mississippi Sound in 1967 was originally reported as a finback but was later determined to be a sei whale.

HUMPBACK WHALE (*Megaptera novaeangliae*)

Humpback whales occur in all oceans. They are a coastal species and feed primarily on krill and fish. The western north Atlantic stock is migratory. Their summer range is from Cape Cod to Iceland, and their winter calving grounds are in the Caribbean Sea (Schmidldy 1981).

The only recent record for the Gulf of Mexico is of an individual sighted in 1962 at the mouth of Tampa Bay (Layne 1965).

RIGHT WHALE (*Eubaleana glacialis*)

Right whales occur in the temperate waters of the north Atlantic, the north Pacific, and the southern hemisphere. In the western north Atlantic, right whales are distributed from Iceland to Florida and the Gulf of Mexico (Leatherwood 1976).

They have been recorded only twice from the Gulf of Mexico and their status is questionable. Two right whales were reported off New Pass, Florida in 1963, and in 1972 one washed ashore near Freeport, Texas (Schmidly 1981).

SEI WHALE (*Balaenoptera borealis*)
Sei whales occur in all oceans, but are rare in tropical and polar seas. They are widely distributed in nearshore and offshore waters of the western north Atlantic from the Gulf of Mexico and the Caribbean Sea to Nova Scotia and Newfoundland (Leatherwood et al. 1976).

Records from the Gulf of Mexico are limited to strandings near Campeched, Mexico and the coasts of Louisiana and Mississippi. The record from Louisiana is of an individual that stranded near Fort Bayou on the western edge of Breton Sound in 1956. The record from Mississippi is of the specimen originally reported as a finback whale. This whale entered Mississippi Sound in 1967 and subsequently died near the entrance to the harbor at Gulfport, Mississippi (Gunter and Christmas 1973). The authors believed this occurrence would not have been possible except for the deep navigation channel leading into Gulfport.

SPERM WHALE (*Physeter catodon*)
Sperm whales were once quite numerous in the Gulf of Mexico, enough so to justify full-scale commercial whaling operations (Lowery 1974). Although no longer common in the Gulf of Mexico, the species has been observed on several occasions in recent years off the mouth of the Mississippi River by fishermen and personnel on exploratory research vessels of the NMFS (Lowerey 1974). Sperm whales were observed 229 miles off the coast of Louisiana in 1980 by Fritts et al. 1983a.

Three strandings along the coast of Louisiana have been reported. An individual stranded near Sabine Pass in 1910, another stranded in 1960 at the mouth of the Mississippi River near Pass a Loutre, and a third stranded on the central coast of Louisiana in Terrebonne Parish in 1977 (Schmidly 1981).

IMPACTS ON THREATENED AND ENDANDERED SPECIES

Recent research has shown that sea turtles are virtually absent from the nearshore waters of the northern Gulf from December through March (Renaud et al. 1995) and would not ever be present far enough inland to be directly impacted by any of the alternatives. This leaves only the possibility of indirect and/or cumulative impacts to sea turtles. Hawksbill and leatherback sea turtles are very unlikely to occur near the study area. Green and loggerhead sea turtles are unlikely to occur, but Kemp's ridley sea turtles may be found in coastal waters near the study area during the summer. Sea turtles (Kemp's ridley) are known to occur in the nearshore environment of the Gulf of Mexico some 15 km (9 miles) south of the closest possible work areas along Highway 57. Therefore, dredging and other construction activities would not be expected to impact areas occupied by Kemp's ridley sea turtle.

Whales are extremely unlikely to be found anywhere near the study area. No adverse impacts would be expected to whales with any of the alternatives.

Piping plover do overwinter in southern most portion of the study area but not within the actual impact area of the recommended plan so they would not be adversely impacted.

Eastern brown pelicans occur in the study area, particularly immature pelicans. Nesting does occur on Racoon Island, which is within the study area. The species also feeds and roosts in the study area. At this time, no adverse impacts are anticipated. As each segment of the levee alignment undergoes detail design, a supplemental NEPA document will revisit this determination.

Bald eagles nest in northern Terrebonne and Lafourche Parishes, primarily west of Bayou du Large. Construction activities within 3,000 feet of bald eagles could be disruptive to feeding and nesting and should be avoided from October through mid-May. Cutting of bald eagle nest trees, or damaging its root system, is strictly prohibited at any time. As each segment of the levee alignment undergoes detail design, a supplemental NEPA document will revisit this determination. As part of this, an aerial survey may be conducted to determine the presence of undocumented eagle nests.

CONCLUSIONS

Neither of the two action alternatives would have adverse impacts upon threatened and endangered species, provided that work areas do not expand to the south of the study area and that the precautions noted above for bald eagle are followed.

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Appendix B

Final Fish and Wildlife Coordination Act Report

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

March 27, 2013

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) has prepared a Fish and Wildlife Coordination Act Report on the U.S. Army Corps of Engineers' (Corps) Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana, Post-Authorization Change (PAC) report. That PAC report is being prepared to quantify costs and impacts of the Morganza, Louisiana, to the Gulf of Mexico Project (MTG) authorized under the 2007 Water Resources Development Act. That PAC report also examines the feasibility, costs, and impacts associated with two levee height alternatives, both of which are located on the alignment selected in the 2002 Feasibility Report. The PAC alternatives would protect against flooding from a 1 percent annual chance of occurrence storm (100-year frequency) and a 3 percent annual chance of occurrence storm (35-year frequency). The 100-yr frequency protection system has been chosen as the Tentatively Selected Plan. The PAC report will programmatically evaluate most project features; however, feasibility level evaluations are desired for the "constructable" features which include levee reaches F1, F2, and G1, plus the Houma Navigation Canal (HNC) Lock Complex and the Bayou Grand Caillou Floodgate.

Since the release of the 2002 Feasibility Report, additional levee reaches have been added to both the eastern and western ends of the proposed MTG levee system. This Coordination Act Report provides an assessment of direct impacts for all project features and indirect impacts for only the constructable features.

Given that indirect impacts remain unquantified for features other than the constructable features, this Coordination Act Report does not fulfill the requirements of the Fish and Wildlife Coordination Act and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act, for those programmatically evaluated project features. However, for the constructable featues, direct and indirect impact analyses have been completed. For those project features, this Coordination Act Report does fulfill the requirements of the Fish and Wildlife Coordination Act and does constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act.

To the greatest degree possible within the very limited time-line, this report addresses comments provided by the National Marine Fisheries Service (NMFS) and the Louisiana Department of

Wildlife and Fisheries on the Service's Draft Fish and Wildlife Coordination Reports, dated May 2012, and December 6, 2012 (Appendix A).

Study area habitats and affected fish and wildlife resources have been described in the April 2002 draft Fish and Wildlife Coordination Act reports, and are incorporated herein by reference.

Direct Wetland Impacts

Programmatic-level estimates of wetland impacts due to project construction have been estimated using 2008 National Wetland Inventory (NWI) data and levee footprint shapefiles provided by the Corps. Historic marsh loss rates (1985-2009) have been applied to 2008 marsh acreages to account for anticipated marsh loss between 2008 and the date of levee reach construction. Based on the Corps-provided construction schedule, and using the medium sea level rise (SLR) scenario, our programmatic-level assessment indicates that construction impacts of the 100-year frequency protection plan would result in a loss of 520 acres of bottomland hardwood forest, 599 acres of cypress swamp, and 2,993 acres of marsh.

Table 1. Summary of construction related direct wetland impacts

Low SLR Scenario				Medium SLR Scenario				High SLR Scenario			
Levee Reach	Hwds (acres)	Swamp (acres)	Marsh (acres)	Levee Reach	Hwds (acres)	Swamp (acres)	Marsh (acres)	Levee Reach	Hwds (acres)	Swamp (acres)	Marsh (acres)
Barrier	202	547	209	Barrier	202	547	209	Barrier	202	547	208
A	81	13	362	A	81	13	361	A	81	13	361
B	0	0	182	B	0	0	182	B	0	0	182
E-1	0	0	94	E-1	0	0	94	E-1	0	0	94
E-2	0	0	39	E-2	0	0	39	E-2	0	0	39
F-1	0	0	359	F-1	0	0	359	F-1	0	0	358
F-2	0	0	147	F-2	0	0	147	F-2	0	0	146
G-1	0	0	165	G-1	0	0	165	G-1	0	0	165
G-2	0	0	53	G-2	0	0	53	G-2	0	0	52
G-3	0	0	43	G-3	0	0	43	G-3	0	0	43
H-1	0	0	112	H-1	0	0	112	H-1	0	0	112
H-2	0	0	187	H-2	0	0	186	H-2	0	0	186
H-3	0	0	103	H-3	0	0	102	H-3	0	0	102
I-1	0	0	83	I-1	0	0	83	I-1	0	0	83
I-2	0	0	86	I-2	0	0	86	I-2	0	0	86
I-3	0	0	91	I-3	0	0	90	I-3	0	0	90
J-1	0	0	84	J-1	0	0	84	J-1	0	0	83
J-2	0	0	103	J-2	0	0	103	J-2	0	0	103
J-3	0	0	26	J-3	0	0	26	J-3	0	0	25
K	0	0	139	K	0	0	139	K	0	0	138
L	0	0	212	L	0	0	212	L	0	0	212
LG	51	0	30	LG	51	0	30	LG	51	0	30
LL	187	39	89	LL	187	39	89	LL	187	39	89
Subtotal	520	599	2,996	Subtotal	520	599	2,993	Subtotal	520	599	2,985
TOTAL			4,115	TOTAL			4,113	TOTAL			4,105

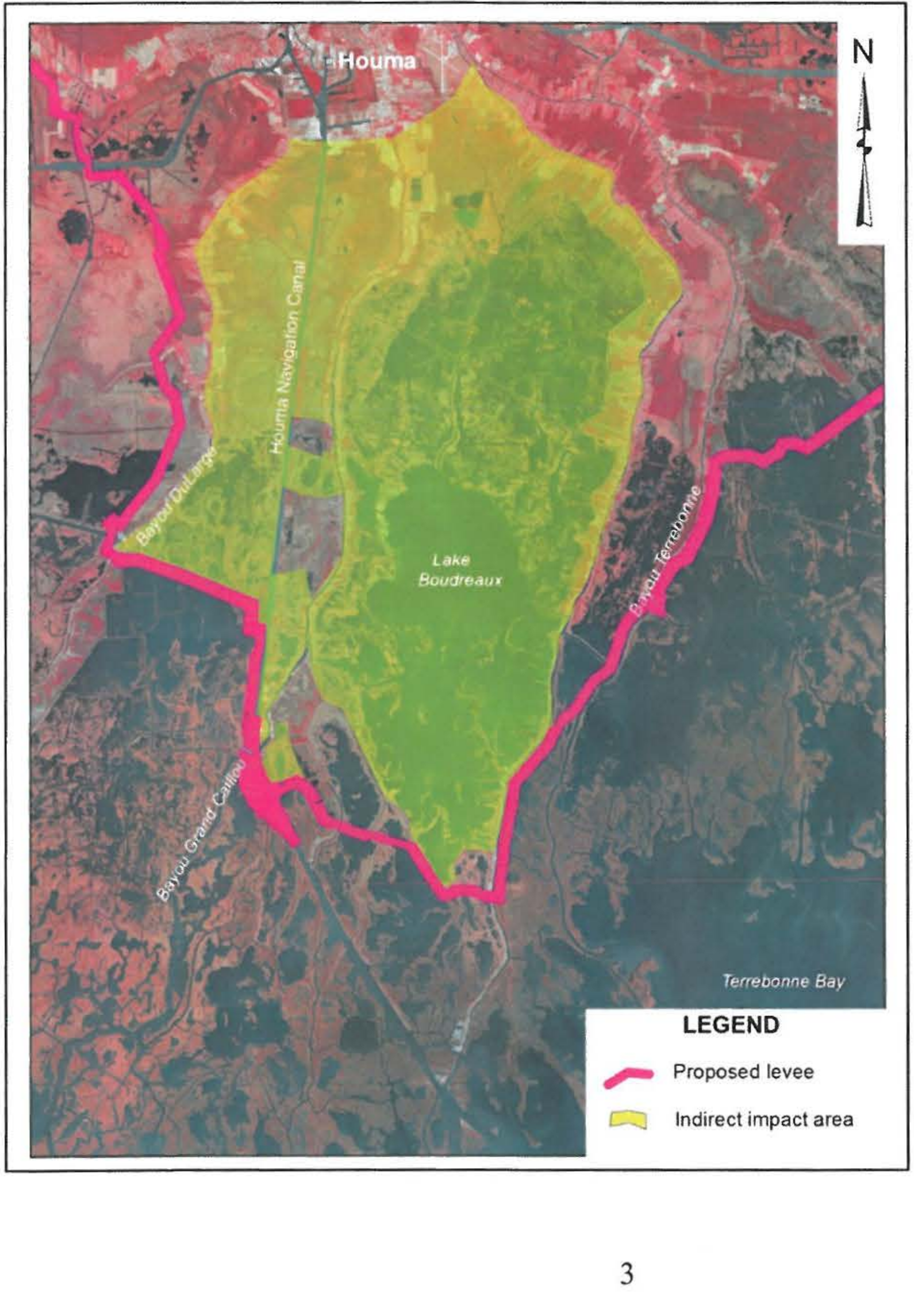
Given the resolution of the NWI data, habitat type misclassification errors, and post 2008 habitat changes, the Service believes that the NWI data is not sufficiently accurate for future feasibility impact assessments in forested wetlands subject to development. The Service recommends that future feasibility impact analyses for MTG levee segments should utilize current aerial imagery and associated ground truthing to determine the types and acreage of those forested habitat impacts. Because direct impacts for the constructable features are primarily marsh habitats, we believe that those acreage estimates are of sufficient detail for a feasibility level analysis. Construction impacts by marsh habitat type are provided in Appendix B.

The constructable features alone would result in the direct loss of 257 acres of fresh and intermediate marsh, and 414 acres of brackish marsh (under the medium SLR scenario). Using the Wetland Value Assessment methodology version 1.1 (WVA), those direct impacts would result in the loss of 392 average annual habitat units (AAHUs).

Indirect Impacts

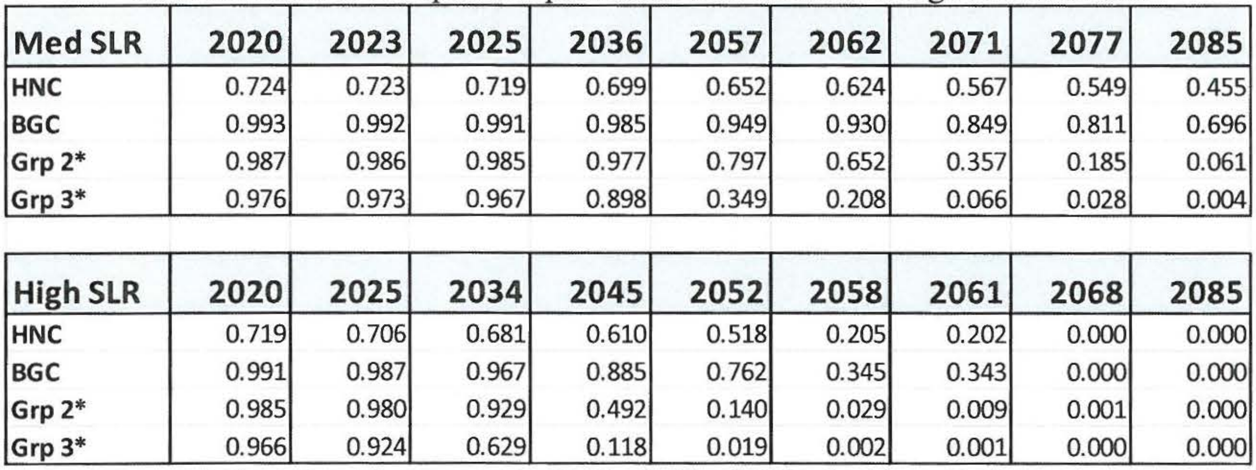
The HET determined that indirect impacts for the constructable features would potentially occur throughout the entire Lake Boudreaux Basin, and in wetland areas north of the lock and adjoining the HNC (Figure 1).

Figure 1. Potential areas affected by constructable features



Indirect impacts were also determined using the WVA. The analysis of structure operations was based upon the March 2013 Operation Plan provided by the Corps (see Appendix C). Loss of fisheries access is the most significant indirect impact. The study schedule did not allow use of methods other than the WVA for assessing impacts to fisheries access or other potential indirect impacts. Because predicted salinities at the end of the project life under the low sea level rise (SLR) scenario were not provided to the Habitat Evaluation Team (HET), indirect impacts under the low SLR scenario could not be estimated. Hence, indirect impacts are available for only the medium and high SLR scenarios. According to the March 2013 Operation Plan, gates associated with the HNC Lock and Bayou Grand Caillou floodgates would be closed for high stages caused by tropical storm events, and for high salinities which threaten drinking supplies taken from the Gulf Intracoastal Waterway in Houma. The frequency and duration of gate closures is expected to increase due to area-wide stage and salinity increases caused by relative SLR. To quantify the percent of time gates would be open, 2003 through 2011 HNC at Dulac stage and salinity data, salinity data from the Louisiana Universities Marine Consortium (LUMCON), and National Hurricane Center data on the duration of Tropical Storm Watches in the project area were compiled into a master spreadsheet and evaluated. Annual percent time open for the HNC, the Bayou Grand Caillou (BGC) Floodgate, and Group 2 and Group 3 structures (identified in the March 2013 Operation Plan) are provided (Table 2).

Table 2. Percent time open for constructable features and other floodgates based on the March 2013 structure operation plan under the medium and high SLR scenarios.



Med SLR	2020	2023	2025	2036	2057	2062	2071	2077	2085
HNC	0.724	0.723	0.719	0.699	0.652	0.624	0.567	0.549	0.455
BGC	0.993	0.992	0.991	0.985	0.949	0.930	0.849	0.811	0.696
Grp 2*	0.987	0.986	0.985	0.977	0.797	0.652	0.357	0.185	0.061
Grp 3*	0.976	0.973	0.967	0.898	0.349	0.208	0.066	0.028	0.004

High SLR	2020	2025	2034	2045	2052	2058	2061	2068	2085
HNC	0.719	0.706	0.681	0.610	0.518	0.205	0.202	0.000	0.000
BGC	0.991	0.987	0.967	0.885	0.762	0.345	0.343	0.000	0.000
Grp 2*	0.985	0.980	0.929	0.492	0.140	0.029	0.009	0.001	0.000
Grp 3*	0.966	0.924	0.629	0.118	0.019	0.002	0.001	0.000	0.000

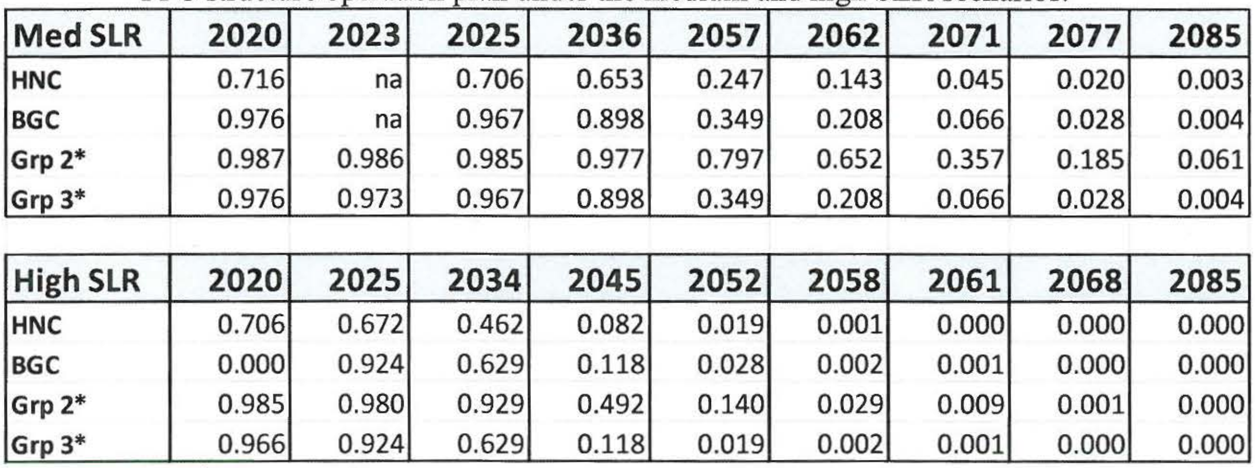
* *Group 2 and 3 structures identified in the March 2013 plan (Appendix C)*

By the end of the project life, under the high SLR scenario, all gates would be closed 100 percent of the time. Should conditions occur that would prompt such a complete system closure, it is unknown how water levels within the system would be managed and the potential for substantial additional indirect impacts to marshes and fish and wildlife resources might occur.

Because permitted operation plans for existing area floodgates allow gate closures for high stages caused by non-tropical events, the HET assumed that a foreseeable future change (FFC) in the March 2013 operation plan could be proposed whereby MTG floodgates would be operated in a similar manner. Consequently, the HET also quantified indirect impacts under such a plan (Table 3).

Under this FFC operation plan, there is almost complete closure of the constructable feature gates by the end of the project life under the medium SLR scenario (Table 3). If this were to occur, it is unknown how water levels within the system would be managed and the potential for substantial additional indirect impacts to marshes and/or fish and wildlife resources might occur. Should project sponsors later wish to modify the proposed operation plan to close the constructable features due to stage alone (independent of storm surge effects), as per the FFC plan, then a revised assessment of indirect impacts and additional compensatory mitigation would be required.

Table 3. Percent time open for constructable features and other floodgates based on the FFC structure operation plan under the medium and high SLR scenarios.



Med SLR	2020	2023	2025	2036	2057	2062	2071	2077	2085
HNC	0.716	na	0.706	0.653	0.247	0.143	0.045	0.020	0.003
BGC	0.976	na	0.967	0.898	0.349	0.208	0.066	0.028	0.004
Grp 2*	0.987	0.986	0.985	0.977	0.797	0.652	0.357	0.185	0.061
Grp 3*	0.976	0.973	0.967	0.898	0.349	0.208	0.066	0.028	0.004

High SLR	2020	2025	2034	2045	2052	2058	2061	2068	2085
HNC	0.706	0.672	0.462	0.082	0.019	0.001	0.000	0.000	0.000
BGC	0.000	0.924	0.629	0.118	0.028	0.002	0.001	0.000	0.000
Grp 2*	0.985	0.980	0.929	0.492	0.140	0.029	0.009	0.001	0.000
Grp 3*	0.966	0.924	0.629	0.118	0.019	0.002	0.001	0.000	0.000

* *Group 2 and 3 structures identified in the March 2013 plan (Appendix C)*

Stage data from the HNC at Dulac gage was used to determine when storm-related gate closures would be needed. Because this gage is 3.5 miles north of the proposed lock site and because high tides are likely to be lower there than at the more gulfward lock site, the above percent time open values could be lower if data from the lock site were available. The group 3 floodgates and water control structures are located primarily on the eastern side of the MTG system. Because stages are generally higher on the eastern side of the system, the above estimates may underestimate closure duration (and overestimate time gates are open) for those gates. During future feasibility analyses of those features, recent stage data is needed from gages in the vicinity of those east side structures to properly assess the duration of MTG east side gate closures associated with current and future sea level rise.

Schedule-related constraints precluded acquisition of some data, utilization of other data sets, and refinement of data inputs, thus leading to increased levels of uncertainty. For example, the WVAs for the enclosed marshes require the input of baseline and future salinities. Model-predicted baseline salinities were much lower than observed salinities in some areas. Consequently, the HET compiled salinity data from a variety of sources and time periods to use as substitute baseline salinities. Model-predicted tidal discharge values were also obtained for project water control structures to assess whether HNC Lock closures (with all other structures open) resulted in increased discharges elsewhere. Although compensatory flow increases at other structures were noted, there was not sufficient time to analyze that data nor utilize it in the assessment of fisheries access impacts.

To help capture the range of uncertainties, the HET analyzed indirect impacts under a low and high impact scenario. Under the low impact scenario, indirect benefits associated with predicted salinity reductions north of the lock serve to reduce indirect impacts due to reduced fisheries access. Under the high impact scenario, salinity reduction benefits were removed leaving only fisheries impacts.

Under the high SLR scenario, the complete loss of marshes throughout the study area would reduce the value of the study area as habitat for estuarine-dependent fisheries. Consequently, the project-induced fisheries access impacts are substantially less significant under the high SLR than under the medium SLR scenario (Table 4).

Table 4. Indirect impact estimates for the constructable features.

	Best Case Scenario AAHUs		Worse Case Scenario AAHUs	
Operation Scenario	**Med SLR**	**High SLR**	**Med SLR**	**High SLR**
March 2013 Operation Plan "plan as is"	-215.69	-287.09	-576.78	-331.00
March 2013 Operation Plan with "foreseeable future change"	-374.73	-379.58	-750.36	-430.10

Impacts associated with changes in water quality or changes in wetland loss rates due to extensive periods of gate closure were not incorporated into the indirect impacts analysis. However, the HET did discuss changing wetland loss rates due to extensive future gate closures. Deprivation of suspended sediment inputs during storm events was considered as a possible adverse impact. Given that storms have recently had a very detrimental impact on marshes within portions of the areas affected by the constructable features, and that most of the affected wetlands were already isolated by existing hydrologic barriers, protection from storm surge impacts could provide some wetland benefits. Given that there may be both positive and negative impacts associated with wetland enclosure (of the areas affected by the constructable features), and because there was not sufficient data nor adequate predictive tools to adjust historic wetland loss rates, the HET decided to leave future with-project wetland loss rates unchanged.

Threatened and Endangered Species

Regarding project-related impacts to Federally-listed threatened and/or endangered species, the Service has reviewed the Biological Assessment (BA) contained in Appendix A of the January 2013 Draft Environmental Impact Statement. In a letter to the Service dated March 25, 2013, the conclusion of that BA was clarified to read "there would be No Affect to Threatened or Endangered Species or their critical habitat due to the Moganza to the Gulf Risk Reduction Project." The Service concurs with this determination for the species under our preview (i.e., the piping plover).

Although the bald eagle (*Haliaeetus leucocephalus*) has been removed from the List of Endangered and Threatened Species, it remains protected under the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) and the Bald and Golden Eagle Protection Act (54 Stat. 250, as amended, 16 U.S.C. 668a-d). Within the reach E-1 levee footprint, an inactive bald eagle nest (nest number 226) was present as late as 2008. A field survey conducted during July 2012 revealed that the nest no longer exists. Other nest trees may exist near the barrier and Lockport to Larose reaches. When those and/or other project features move into the feasibility stage, the project sponsors should solicit Service input regarding the need to conduct surveys for the presence of bald eagle nests in the project vicinity. Additionally, 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 is found, one may go to the Service's web site to obtain guidance on avoiding impacts (http://www.fws.gov/southeast/es/baldeagle/).

Mitigation of Impacts

The constructable features (levees and control structures) would result in the direct loss of 671 acres of marsh and a loss of 392 Average Annual Habitat Units (AAHUs) over the project life (Table 5). Assuming that the project sponsors select the March 2013 operation plan with high impact scenario (Table 4) as the likely indirect impact scenario, the total acreage of marshes needed to mitigate both direct and indirect impacts is 2,740. Because of differences in land loss rates, average water depths, and other factors, mitigation ratios are specific to a particular study area polygon. Polygons B13, B15, and C17 (Figure 2) are the study area polygons used to generate the mitigation ratios for FM/INT marsh, BR marsh, and SAL marsh, respectively.

Table 5. Direct and indirect impacts of constructable features, and mitigation requirements.

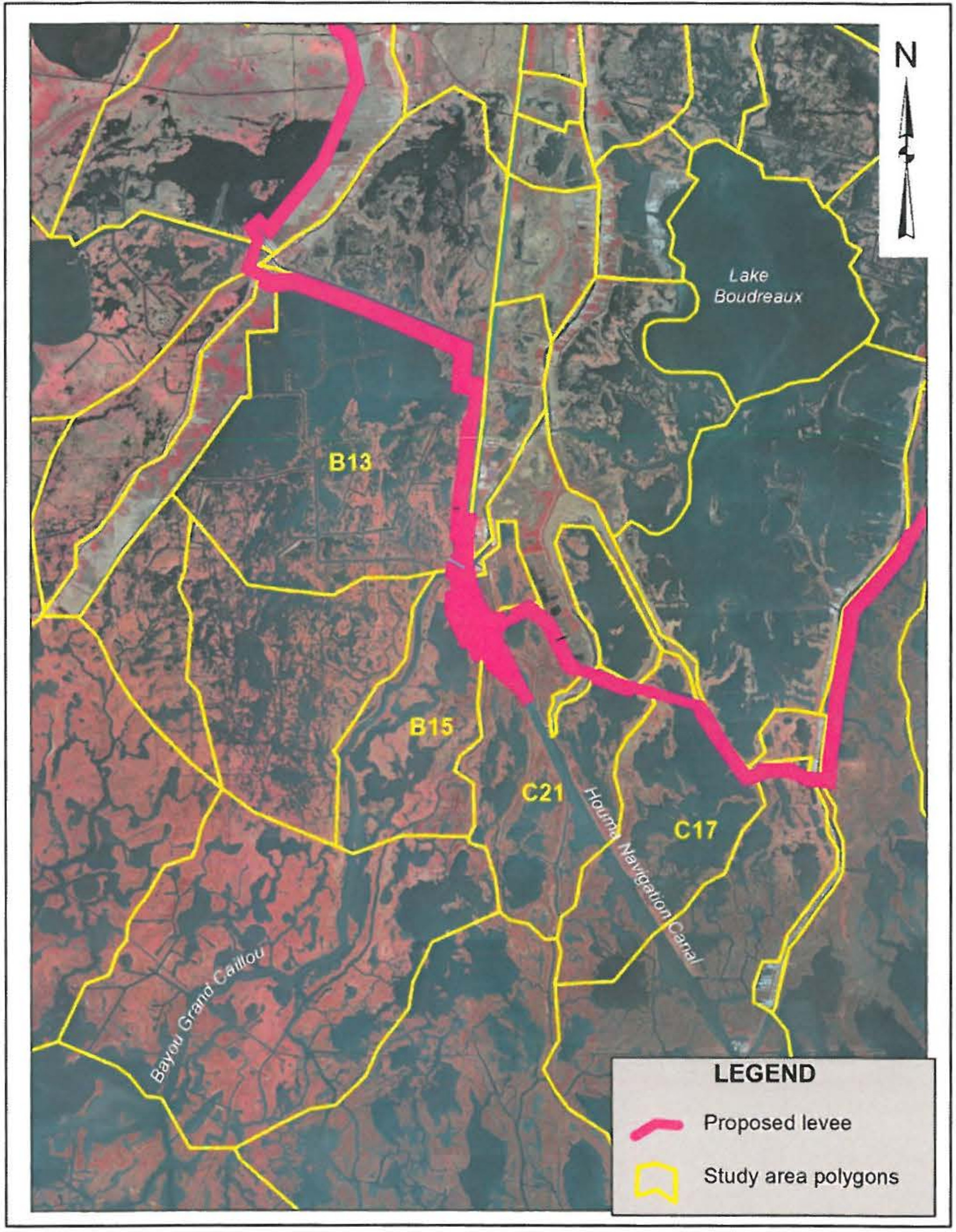
	Direct Impacts		**Indirect Impacts***	**TOTAL Impacts**	**Mitigation Ratio[+]**	**Marsh Creation Mitigation**
Habitat Type	**acres**	**AAHUs**	**AAHUs**	**AAHUs**	**(acres/AAHUs)**	**acres**
FM marsh	26.4	-12.74	-39.73	-52.47	3.46	182
INT marsh	230.11	-28.04	-353.96	-382.00	3.46	1,322
BR marsh	414.12	-350.98	-41.33	-392.31	2.21	867
SAL marsh	0	0	-141.76	-141.76	2.61	370
TOTAL	670.63	-391.76	-576.78	-968.54		2,740

* *March 2013 Operation Plan, high impact estimate*

[+] *acres of marsh creation needed to generate one AAHU*

Should project sponsors wish to construct mitigation elsewhere, mitigation ratios for those areas will need to be determined. Note that all assessments of impacts and mitigation needs were conducted under the medium SLR scenario.

Figure 2. Study area polygons where mitigation is being considered.



Because of the complexity and scope of this study, many details regarding the design and operation of project features must be addressed during the post-authorization phase; hence, precise estimates of project-related impacts/benefits associated with all project features cannot be provided until the designs of all project features are finalized. Because designs for several critical floodgates have not yet been completed, the assessment of local and system-wide hydrology effects cannot yet be concluded and additional hydrologic impact assessments will be needed.

Extensive coordination between the Corps and the Service will be required throughout the post-authorization phase to ensure that impacts to coastal wetlands and associated fish and wildlife resources are avoided and minimized to the greatest degree possible and that adequate and effective mitigation measures are implemented to compensate for unavoidable impacts. Substantial direct wetland losses will result from construction of project features. Consequently, avoidance and minimization of direct wetland impacts should be pursued to the greatest extent practicable. The Service does not oppose the implementation of the constructable features and provides the following recommendations to avoid and/or minimize project impacts on fish and wildlife resources, and for mitigating unavoidable impacts to those resources.

1. The Post Authorization Change Report, in keeping with the project's Congressional Authorization, should clearly reiterate that features of the Tentatively Selected Plan will be designed to maintain existing freshwater inflows from the Atchafalaya River via the Gulf Intracoastal Waterway. Those designs shall accommodate restoration needs determined via future restoration planning, to the extent possible. The Service also recommends that the Corps provide the Service with the opportunity to review and comment on model assumptions and input data prior to initiating the modeling analyses necessary to complete those tasks. Tasks should include the following:

   a. Future design of the Grand Bayou Floodgate should accommodate southward freshwater flows.
   b. Construction of Reach L and K levees should avoid use of material dredged from Grand Bayou Canal and from the Cutoff Canal so that saltwater intrusion via those channels is not increased.
   c. The eastern Gulf Intracoastal Waterway (GIWW) floodgate should have the smallest possible cross-section to reduce the loss of Atchafalaya River freshwater to the Barataria Basin and to retain that freshwater within the Terrebonne Basin.
   d. The design of the west GIWW floodgate should avoid stage increases west of that structure and should be capable of passing Atchafalaya River freshwater flows, especially during periods of high Atchafalaya River stages, without any loss of flow.
   e. The two environmental water control structures along Falgout Canal should be designed and operated to only discharge freshwater southward and not to allow northward flow of saltwater into Falgout Canal.

2. The Corps should coordinate closely with the Service and other fish and wildlife conservation agencies throughout the pre-construction engineering and design phase of project features including levees, floodgates, and environmental water control structures 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.

3. Operational plans for floodgates and water control structures, excluding the Falgout Canal environmental structures, the HNC Lock Complex, and the east GIWW floodgate, should be developed to maximize the open cross-sectional area

for as long as possible. Operations to maximize freshwater retention or redirect freshwater flows could be considered if hydraulic modeling demonstrates that is possible and such actions are recommended by the natural resource agencies. Development of water control structure operation manuals or plans should be done in coordination with the Service and other natural resource agencies.

4. To the greatest extent possible, the Bayou Grand Caillou floodgate should remain open during HNC Lock Complex saltwater closure periods to maintain water exchange in this natural bayou and thereby reduce or avoid impacts to fish access.

5. The location of the Barrier Reach, Reach A, and the Larose to Lockport levees should be modified to reduce direct wetland impacts and enclosure of wetlands, to the degree possible. Features such as spoil bank gapping or other measures should also be added to avoid impacts to enclosed wetlands due to unintentional impaired drainage. The Corps should coordinate with the Service and other natural resource agencies to develop the best approach for avoiding drainage impacts.

6. Estimates of all direct and indirect project-related wetland impacts, including those associated with fisheries impacts and/or changes in freshwater inflows and distribution, should be refined during the engineering and design phase, including indirect impacts associated with the constructable features should the changes be made in the March 2013 structure operation plan (Appendix C).

7. To determine acreage of forested habitat types impacted by future levee construction activities, those acreages should be obtained by digitizing current aerial imagery and ground truthing, rather than through use of 2008 NWI data.

8. To the greatest degree practical, the hurricane protection levees and borrow pits should be located to avoid and minimize direct and indirect impacts to emergent wetlands. Efforts should be made to further reduce those direct impacts by hauling in fill material, using sheetpile for the levee crest, deep soil mixing, or other alternatives. Borrow pit construction should also avoid the following:
   a. avoid inducing wave refraction/diffraction erosion of existing shorelines
   b. avoid inducing slope failure of existing shorelines
   c. avoid submerged aquatic vegetation
   d. avoid increased saltwater intrusion
   e. avoid excessive disturbance to area water bottoms
   f. avoid inducing hypoxia

   A plan for monitoring borrow pit dissolved oxygen concentrations should also be developed to assess if hypoxia occurs in pits used for levee construction (provided construction is not from a navigation channel) and in pits needed for mitigation construction. Recommended hypoxia monitoring is as follows:

   > Measure specific conductance, temperature, dissolved oxygen, and pH in at least one location in the borrow pit. A calibrated multiparamter probe should be used. The sites(s) should be profiled at 5 to 10-ft intervals,

depending on depth and conditions, from the water bottom to the surface. Samples should be collected one time during each of the months of April, September, and October, and twice a month, about 2 weeks apart, during May through August. Sampling frequency should be increased to twice monthly during September and October as necessary.

9. When organic soils must be removed from the construction site, that material should be used to create or restore emergent wetlands to the greatest extent practicable. If that is not practicable, then use of that material to improve borrow pit habitat quality (e.g., construct bank slopes, reduce depths, etc.) should be examined.

10. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds, when practicable.

11. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. Surveys prior to construction should be undertaken by the construction agency to ensure no nesting birds are within 1,000 feet of any proposed work. If nesting birds are found within 1,000 feet of any proposed work sites, the Service and the Louisiana Department of Wildlife and Fisheries should be contacted for procedures to avoid impacts.

12. Full, in-kind compensation (quantified as AAHUs) should be provided for unavoidable net adverse impacts on forested wetlands, marsh, and associated submerged aquatic vegetation, including any additional losses identified during post-authorization engineering and design studies. Mitigation planning, including site selection and design, should be closely coordinated with the Service and other interested natural resource agencies. To help ensure that the proposed mitigation features meet their goals, the Service provides the following recommendations.

    a. Mitigation measures should be constructed concurrently with the features that they are mitigating (i.e., mitigation should be completed no later than 18 months after levee construction has begun). Completion of mitigation means that initial fill elevations have been achieved. If mitigation is provided via an in-lieu fee program, completed mitigation would be achieved when credits were purchased from an approved mitigation bank.
    b. If mitigation is not implemented concurrent with levee construction, the amount of mitigation needed should be reassessed and adjusted to offset temporal losses of wetland and Essential Fisheries Habitat functions.
    c. Proposed mitigation in the open water area south of Falgout Canal (in subunit B13) should be coordinated with ongoing Corps Regulatory Branch mitigation plans to avoid conflicts with other permitted activities.
    d. In coordination with the Service and other fish and wildlife conservation agencies, the Corps should address the Environmental Protection Agency's 12 requirements for each mitigation measure (Appendix D).
    e. Mitigation performance should be assessed using the final performance criteria currently being developed by the Corps and natural resource

agencies for the Hurricane Storm Damage Risk Reduction Study.

f. The Service and other fish and wildlife conservation agencies should be consulted in the development of plans and specifications for all mitigation features and any monitoring and/or adaptive management plans.

g. Unavoidable impacts to wetlands within Mandalay National Wildlife Refuge should be mitigated on the refuge.

h. The acreage of marsh created to mitigate project impacts should meet or exceed the marsh acreage projected by the Habitat Evaluation Team for target year 5. If deficiencies occur in year 5 acres, additional mitigation shall be provided.

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

j. To avoid shortfalls in marsh creation acreage, the contractor should be required to guarantee the creation of at least the target acreage of marsh platform, or excess acres should be created.

k. The acreage of marsh created for mitigation purposes, and adjacent affected wetlands, should be monitored over the project life to evaluate project impacts, the effectiveness of compensatory mitigation measures, and the need for additional mitigation should those measures prove insufficient.

l. Dredged material borrow pits, including those utilized to create marsh for mitigation purposes, should be carefully designed and located to minimize anoxia problems and excessive disturbance to area water bottoms, and to avoid increased saltwater intrusion.

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

13. Additional information is needed by the Service to complete the required evaluation of project effects and fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act. Much of that information will not be available until engineering and design of the project features has progressed. To help ensure that sufficient information is provided, the Service recommends that the Corps perform the following tasks during the engineering and design phase.

    1. Provide additional information on anticipated construction techniques and their associated wetland impacts, such as additional dredging to install floodgates and water control structures, dredging temporary by-pass channels, and the method for disposing organic surface soils that are unsuitable for levee construction.
    2. Provide final locations and designs for borrow sites used in levee construction.

14. Funding should be provided for full Service participation in the post-authorization

engineering and design studies, and to facilitate fulfillment of its responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act.

15. The Corps should obtain a right-of-way from the Service prior to conducting any work on Mandalay National Wildlife Refuge, in conformance with Section 29.21-1, Title 50, Right-of-Way Regulations. Issuance of a right-of-way will be contingent on a determination that the proposed work will be compatible with the purposes for which the Refuge was established.

16. All construction or maintenance activities (e.g., surveys, land clearing, etc.) on Mandalay National Wildlife Refuge (NWR) will require the Corps to obtain a Special Use Permit from the Refuge Manager; furthermore, all activities on that NWR must be coordinated with the Refuge Manager. Therefore, we recommend that the Corps request issuance of a Special Use Permit well in advance of conducting any work on the refuge. Please contact the Refuge Manager (985/853-1078) for further information on compatibility of flood control features, and for assistance in obtaining a Special Use Permit. Close coordination by both the Corps and its contractor must be maintained with the Refuge Manager to ensure that construction and maintenance activities are carried out in accordance with provisions of any Special Use Permit issued by the NWR.

17. If mitigation lands are purchased for inclusion within a NWR, those lands must meet certain requirements. A summary of some of those requirements was provided in Appendix C to our May 2012 Coordination Act Report. Other land-managing natural resource agencies may have similar requirements that must be met prior to accepting mitigation lands; therefore, if an agency is proposed as a manager of a mitigation site, they should be contacted early in the planning phase regarding such requirements.

18. The Corps should contact the Louisiana Department of Wildlife and Fisheries prior to conducting any work on Point au Chien Wildlife Management Area (985-594-5494).

To fully evaluate indirect impacts of MTG structure operations on enclosed wetlands and fisheries access, the Service provides the following recommendations regarding information needed to conduct a full assessment of indirect project impacts and benefits.

1. Because stages are generally higher along the more exposed MTG east side, historic stage data (in NAVD88) from locations near proposed MTG east-side floodgates should be provided to the Service to facilitate prediction of future closure durations for floodgates along the MTG east side.

2. Hydraulic model runs to predict salinities at target-year 50 year were conducted for the medium and high sea level rise scenarios, but not for the low sea level rise scenario. Model runs should also be conducted to predict salinities at target year 50 for the low sea level rise scenario.

3. Conduct fish passage modeling during the preconstruction engineering and design

phase if determined necessary through continuing coordination with interested resource agencies. At a minimum, this should consist of Particle Tracking Method.

Given that design and evaluation of most project features has been at a programmatic level, the Service cannot fulfill its Coordination Act responsibilities at this time. For the constructable features, we hope to complete the assessment of impacts in time for inclusion in the Final Environmental Impact Statement. To complete those assessments, we may require additional funding during the next several months. Estimates of those funding needs should be coordinated in advance with the Service, and should be based on the nature and complexity of issues associated with the project design and implementation.

Provided that the above recommendations are included in the feasibility report and related authorizing documents, the Service does not oppose further planning and implementation of the Tentatively Selected Plan (i.e., the 100-yr frequency system). If you have any questions regarding the above information, please contact Mr. Ronny Paille of this office (337-291-3117).

Sincerely,

Jeffrey D. Weller
Supervisor
Louisiana Ecological Services Office

cc: SE Refuges, Bayou LaCombe, LA
EPA, Dallas, TX
NMFS, Baton Rouge, LA
NRCS, Alexandria, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CMD), Baton Rouge, LA
LA OCPR, Baton Rouge, LA

APPENDIX A

Agency Comments letters on the May 2012 and December 2012 draft Fish and Wildlife Coordination Act Reports

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

June 8, 2012 F/SER46/PW:jk
225/389-0508

Mr. Jeffrey D. Weller, Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service
646 Cajundome Blvd., Suite 400
Lafayette, Louisiana 70506

Dear Mr. Weller:

NOAA's National Marine Fisheries Service (NMFS) has received the draft Fish and Wildlife Coordination Act Report (Report) on the Corps of Engineers' (USACE) "Mississippi River and Tributaries – Morganza to the Gulf, Louisiana, Post-Authorization Change (PAC) Report." The project's primary objective is to provide hurricane flood protection up to a 100-year recurrent frequency storm event. Only levee reaches F1, F2, G1, the Houma Navigation Canal (HNC) Lock and Bayou Grand Caillou floodgate and associated mitigation are proposed for construction authorization because detailed engineering and design is not presently available for the remainder of features. The majority of the project features are evaluated at an updated, but programmatic level.

As described in the Report, the Tentatively Selected Plan is the 100-year protection alternative. The constructible features alone under that plan would result in 39 and 351 acres of intermediate and brackish marsh impacts, respectively. Total direct impacts to emergent non-fresh tidally influenced marsh for the entire 100-year alternative is estimated to be 2,105 acres. Total direct impacts to tidal open water would be 3,150 acres from dredging or filling. All marsh and tidal water impacts have been designated as essential fish habitat. Impacts to forested wetlands also would occur. Engineering and design details are unavailable to completely assess direct, indirect, and cumulative impacts for all reaches and structures.

NMFS has reviewed and concurs with the majority of descriptions, positions, and recommendations in the Report. However, NMFS is concerned primarily with two issues: 1) adequacy of mitigation; and, 2) uncertainties of the impacts (direct, indirect, and cumulative) to habitat and fisheries. NMFS requests the expansion of description and recommendations in the Report pertaining to these items.

GENERAL COMMENTS

Mitigation

Development of mitigation overall and for the near term constructible features is incomplete and therefore inadequate thus far. The Final Report should be revised to clarify that mitigation planning for the constructible features is incomplete until detailed specifics on all 12 requirements in the USACE and Environmental Protection Agency's (EPA) 2008 final mitigation rule are developed through coordination with the natural resources agencies. This development should occur to allow inclusion of these details in the draft and final revised Programmatic Environmental Impact

Statement (PEIS) and the Record of Decision. Of the 12 items, we request the Report recommend a site protection instrument, performance standards, monitoring requirements, long-term management plan, adaptive management plan, and financial assurances be developed and committed to by the USACE for all mitigation. We recommend the mitigation performance standards and monitoring developed for the Hurricane Surge Damage Risk Reduction (HSDRRS), Lake Pontchartrain and Vicinity be used which are available in your office or upon request from NMFS and the USACE staff working on HSDRRS.

Possible marsh creation sites have been assessed to compensate for the constructible features. One of the sites consists of marsh creation in open water south of Falgout Canal located in subunit B13. NMFS supports consideration of mitigation in that location. However, it is reasonably foreseeable that mitigation for multiple local levees pending authorization by the Regulatory Branch may be sited within this open water area. Depending on the number of permits and the type of mitigation (i.e., terracing or marsh creation), space and layout may become a limiting factor precluding mitigation opportunities for either levee construction program. NMFS recommends the Report encourage coordination amongst the USACE and natural resource agencies regarding both Regulatory and civil works needs to develop acceptable mitigation. There is likely room to accommodate mitigation needs for both programs if developed synergistically rather than separately.

Timely implementation of mitigation is concerning because potential delays from the time levee impacts occur until functional mitigation is attained can cause substantial temporal loss of wetlands and associated functions. The draft Report recommends "concurrent" mitigation; however, the definition of concurrent in application is unclear and has become problematic. Ideally, it is preferable to have mitigation constructed literally at the same time as impacts occur. Conversely, some applications have allowed "concurrent" to be defined as the construction completion of all levee reaches. NMFS recommends the Report stipulate mitigation for each reach should be completed no later than 18 months from the initiation of levee construction for that reach. This avoids unfilled mitigation obligations if a date to begin mitigation is required and there is a change in project schedule. It also considers the construction duration with an ample contingency for marsh creation using dedicated dredging as the type of mitigation. This is consistent with recent provisions being required by the Regulatory Branch for interim levees along the Morganza alignment, as well as being requested of the Plaquemines Federal Assumption of Non-Federal Levees and the New Orleans to Venice Levees. NMFS supports EPA's stipulation in their April 17, 2012, letter on the Plaquemines projects that "completed" means mitigation has either been addressed through purchase of credits at an appropriate mitigation banks, sufficient contributions to an approved in-lieu fee program, or initial fill elevations have been achieved for a USACE's performed marsh creation project. We further recommend the Report stipulate that additional mitigation should be assessed if there is a delay in implementing mitigation or in development of projected wetland functions.

No progress has been made by the USACE since the 2002 PEIS in coordinating with the natural resource agencies pertaining to updating and improving mitigation planning for those levee reaches not identified as "constructible". The draft Report quantifies the significant amount of wetland loss by subunit in the project area and the landscape implications and importance due to that loss projected in the future. NMFS continues to be very supportive of creating marsh for mitigation using dedicated dredging. We request the Report be revised to request initiation of mitigation planning, and to the maximum extent practicable, to stress that marsh mitigation be sited on the flood side of the levee system as the preferred method and location of mitigation. Locating the mitigation on the flood side of the levees may afford some protection for the levee while maximizing wetland functions.

Uncertainties of Impacts to Fisheries and Wetlands

By USACE's admission, the water control structure closure trigger elevation may need to be increased to account for relative sea level rise. As described in the Report, the closure criteria proposed by USACE is +3.5 ft NAVD88. In the future as sea level rises and enclosed elevations subside, the local sponsor may desire more frequent closure of structures to reduce damages from higher stages unrelated to storm events. Such operations are not covered by the PEIS for the current PAC report. Because of reasonably foreseeable desires to operate structures, NMFS believes the USACE should quantify the frequency and duration of all structure closures in the future with sea level rise (SLR) at the +2.5 ft NAVD 88 elevation generally desired by the local sponsor during periods there is not a named storm in the Gulf of Mexico. NMFS requests the Report be revised to both identify the need to assess future closure frequency and duration and request quantification by the USACE of potential associated impacts to wetlands and fisheries under these closure and SLR scenarios.

Various sections of the Report indentify uncertainties associated with the project. We recommend the Report be revised to have a sub-section that consolidates a discussion and lists uncertainties with the evaluation to-date, including data, assessment methods, project schedule, etc. This would allow for better context of individual and compounding uncertainties, their relative magnitude, and would further emphasize the programmatic nature of the assessments.

Although the interagency Habitat Evaluation Team agreed to not assess impacts to fisheries using the Wetland Value Assessment (WVA) methodology, NMFS did not conclude the project would have minimal impacts to fisheries. A decision to not assess potential impacts to fisheries with the WVA was based upon: 1) the individual and compounding uncertainties of data limitations and project schedule; and,2) concession at this programmatic level that a determination of net overall impacts to both wetlands and fisheries may not be possible at this time. NMFS recommends the Report be revised to clarify the determination of impacts to fisheries, its limitation, and the need to reassess impacts to fisheries during the preliminary engineering and design phase prior to supplemental environmental clearance.

SPECIFIC COMMENTS

Page i. For emphasis, insert "including mitigation" after "project features" in the first sentence of the last paragraph.

Page 8, Evaluation Methodology. The following are items to incorporate into a listing of uncertainties under this section or by reference to an appendix to the Report.

- When adjusting wetland loss rates increases, perhaps adjustments should consider coastwide marsh of like marsh type rather than all non-fresh marshes.
- USACE stipulated project schedule limitations prevented obtaining site specific data to conduct WVAs in most instances. Notable examples are the absence (in total or since the revised PEIS) of field verified percent cover of submerged aquatic vegetation and water depths.
- Due to the study schedule, predicted salinities were not available under future with SLR conditions.

Page 12, WVA Methodology. NMFS appreciates the efforts, leadership, and interagency coordination by your staff to conduct the WVA of project impacts. NMFS neither concurs nor disagrees with the WVA results at this time pending a verification of methods and results during our review of the revised PEIS. The acreage derived mitigation ratio for marsh (i.e., 1.36:1 for total impacts) is unexpected when using the WVA.

Page 14. NMFS does not concur with paragraph 4 regarding potential project impacts to fisheries. The frequency and duration of water control structure closures should be consistent with the project authority and operation plan which is storm related flood protection and closure in exceedence of +3.5 ft NAVD 88. An average closure of 1 or 2 days per year should be verified and substantiated based upon storm frequency and the time necessary in advance of and following storms to close and open the structures once water levels are less than +3.5 ft NAVD 88. Further, the Report should identify and discuss as a reasonably foreseeable risk that the frequency and duration of structure closures may increase in the future with SLR. The Report should revise this paragraph as well as under the Evaluation of Alternative Plans section to discuss that potential in response to two scenarios: 1) SLR; and, 2) potential adjustments in project authority and therefore closure elevation. Although potential impacts associated with the limits of the project authority are considered, it is important to note in the Report that interim levee measures being permitted by USACE Regulatory Division allow structures to be closed when water levels at the gates approach +2.5 ft NAVD 88. If a "named" storm is in the Gulf of Mexico and a sudden rise in water level due to storm surge is expected, the gates may be closed at +2.0 ft NAVD 88. Therefore, despite the limitations of the present USACE's interpretation of the project's authority, it is reasonably foreseeable that both tidal and storm flood protection provided by interim levees would be desired of the civil works project. Likely substantial adverse impacts to fisheries for that potential scenario should be mentioned in the Report.

Page 15. The first paragraph references mitigation south of Falgout Canal and in Felix Lake as being located in subunits identified as B13 and B15, respectively. Figure 6 on Page 8 has the subunits labeled differently. However, NMFS concurs that B13 and B15 correspond with the described locations based on a different map provided during the planning process. It is suggested either Figure 8 be replaced with the alternative map or a second map be appended to the report to provide clarification.

Page 21. Due to storm surge magnification, the independent utility of the Morganza project may be in jeopardy without adding or elevating levee reaches in the vicinity east of Larose. If features of any type are added, the Evaluation of Alternative Plans section of the Report should be revised to discuss additional impacts to fish and wildlife habitat.

The Evaluation of Alternative Plans section of the Report should be revised to discuss potential temporary impacts to fisheries associated with coffer dam closures, if used, to construct floodgates and environmental water control structures.

Page 26. NMFS believes the project may result in an unquantified amount of impacts to fisheries. The vicinity of Bayou Plat (reach G1) and north of levee reaches G2 and G3 are example areas. Assessments were made by NMFS of the changes in hydrologic connection and associated fish access related to interim non-civil works measures in these areas. Change in cross sectional area providing sheet flow and tidal exchange was estimated for Reaches G2 and G3. For both of these reaches, approximately 14% and 10% for reaches G2 and G3, respectively of the future without cross-sectional area available for fishery movement would remain when the structures are open.

These reductions would hinder fish access to habitat on the north side of the levee. The Report should be revised to identify the potential impacts to fisheries accessing marshes that would be north of Reach G1, G2 and G3. However, the minimum amount of openings necessary to avoid impacts to fisheries (by species and life stage) is not known. The Report should be revised to include and discuss the above as an indication of potential implications of the Morganza features to fisheries. The Report also should indicate the need during preliminary engineering and design to further assess potential impacts to fisheries and develop means to avoid, minimize, and mitigate those impacts yet to be identified.

Page 30. Coordination by the USACE on developing mitigation for the constructible features has been inadequate. We recommend this section of the Report identify the mitigation shortcomings raised above.

Page 33. The last sentence of the first paragraph should be revised to include "and reassess need to compensate for indirect impacts to wetlands and fisheries."

Page 35. NMFS requests Service Recommendation 10 pertaining to mitigation be expanded. Specifically, the need to rectify shortcomings identified above, as well as to include the 12 items required by mitigation regulations, should be discussed. Mitigation shortcomings that should be discussed include, the need for a site protection instrument, performance standards, monitoring requirements, long-term management plan, adaptive management plan, and financial assurances for each mitigation site. Other requests to expand recommendations are identified above under the General Comments.

We appreciate the coordination during the impact asssessment and for the opportunity to review and comment on the Report. Continued coordination with NMFS under the Fish and Wildlife Coordination Act will be necessary as this project progresses.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
F/SER46, Swafford
USACE, Dayan
LDWF, Balkum, R. Bourgeois
EPA, Ettinger
Files

UNITED STATES DEPARTMENT OF COMMERCE
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Southeast Regional Office
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January 8, 2013 F/SER46/PW:jk
225/389-0508

Mr. Jeffrey D. Weller, Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service
646 Cajundome Blvd, Suite 400
Lafayette, Louisiana 70506

Dear Mr. Weller:

NOAA's National Marine Fisheries Service (NMFS) has received the draft Supplemental Fish and Wildlife Coordination Act Report (Report) for the Morganza, Louisiana, to the Gulf of Mexico Hurricane Protection Project. The Report updates the May 2012 draft Report. The U.S. Army Corps of Engineers (USACE) is preparing a Post-Authorization-Change Report (PAC) and draft revised programmatic Environmental Impact Statement (RPEIS) for the project. The PAC alternatives consist of levees to protect from storms with 100-year and 35-year return frequencies. Features in the PAC are evaluated at a programmatic level except "constructable" features comprised of levee reaches F1, F2, and G1; the Houma Navigation Canal (HNC) Lock Complex; and the Bayou Grand Caillou (BGC) Floodgate.

NMFS has reviewed the supplemental Report and submits the following General and Specific comments and recommendations to be addressed in the final Report prior to its incorporation into a Final Environmental Impact Statement.

General Comments

During early 2012, Project Delivery Team (PDT) meetings for this project were suspended. Further, there were infrequent opportunities for the interagency Habitat Evaluation Team to discuss matters with equal information or coordination which had been provided by the USACE to the U.S. Fish and Wildlife Service (FWS). Pursuant to the Fish and Wildlife Coordination Act (FWCA), the USACE's must provide NMFS adequate opportunity to assess impacts. In the future, more frequent and routine coordination should be re-established with natural resource agencies on this project to resolve matters on data needs, impact assessments, and adequate mitigation plan development.

Important issues remain unresolved for the project which are the responsibility of the USACE. The frequency and duration of closures for all structures over the project life under each of the three sea level rise scenarios must be determined and considered when assessing indirect impacts. Preliminary determination on closures by the FWS remains under debate and unconcluded. Mitigation planning (site selection, design, and a complete plan) is largely incomplete at this time for both programmatic and near term constructable features.

Determination of indirect impacts is incomplete due to lack of necessary data needed from the USACE as well as resolution of impact assessment methods (e.g., fisheries). Last, acceptable mitigation must be developed prior to final clearance of the project. Mitigation planning needs much attention by the USACE. No consolidated description or complete draft mitigation plan has been provided by the USACE to the natural resource agencies. For example, figures depicting conceptual layout of mitigation sites and corresponding borrow have not been developed by the USACE and provided for review by natural resource agencies. If the draft RPEIS contains such details, it would be the first opportunity for natural resource agency review.

NMFS finds that time and data made available to date by the USACE, as the Federal action agency, is limiting and insufficient to complete assessment of all impacts to fisheries and determine recommendations. Many details remain unspecified or are being provided in a piecemeal incomplete fashion.

NMFS concurs that direct impacts in the supplement supersede those in the May 2012 draft Report and the assessment of indirect impacts now must be revised and incorporated based on changes to the operation plans. The Report should indicate all necessary data to assess indirect impacts should be provided by the USACE, the assessment be conducted, and findings be included in the Final Report prior to its incorporation into the Final RPEIS.

The Report indicates the FWS does not consider periodic closures of the HNC Lock Complex as causing impacts to fisheries access because water exchange is provided elsewhere by the BGC floodgate and other channels. At this time, NMFS finds insufficient information has been provided to support such a conclusion and does not concur with the methods applied by FWS to assess impacts north of the HNC Lock Complex and BGC floodgate. It is noted that time provided by the USACE limited the opportunity for coordination and resolution on this and related matters. In the future, we request the USACE allow adequate time for such matters to be resolved within technical proceedings such as working meetings, conference calls, or webinars.

Overall, it is important to consider different analytical options which bracket the range of potential environmental outcomes, especially in light of uncertainties in available data and analytical methods. Consistent with the both the FWCA and the intent in the National Environmental Policy Act, all agencies should identify and develop methods and procedures to assess impacts to the environment such that means to prevent or mitigate those impacts are considered. To that end, NMFS continues to advise the FWS that there is no single or best method to assess potential impacts to fisheries for this project. To the contrary, multiple methods should be considered. The Report should be revised to further identify methods and acknowledge their limitations to assess impacts to fisheries by themselves and in combination with data or tools used to inform them.

On a broad scale, fisheries impact assessment methods range from rudimentary analyses such as the Wetland Value Assessment (WVA) Methodology to more sophisticated analyses such as numeric fish passage and production modeling, all of which have shortcomings. To explain, three present methods exist when determining values to enter for Variable 6, fish access, under the WVA. These methods include: 1) Traditional Method; 2) Percent Open Channel (POC)

Method; and, 3) Average or Tidal Flux Method. However, none of these methods, or the WVA marsh models themselves, have been proven by validation. Further, the minimum amount of opening necessary to maintain "optimal" fisheries functions for enclosed wetlands is not known. Care must be taken when applying these methods individually or in combination within the WVA to remain consistent with the assumptions which are the basis for each method and the rating values for various water control structures. Proposed methods for the Falgout Canal Wetlands area propose adjusting a structure rating which was developed with consideration of variable configurations with the percent time the structure may be open. The structure ratings for actively operated water control structures already include variability in structure configurations. Therefore, no adjustment should be made when calculating the V6 value based on range of potential structure configurations because of a redundant or "double counting" effect.

The Report suggests consideration of the tidal flux method to resolve matters to assess impacts to fisheries. Although this method may be accepted as practicable once necessary data are provided by the USACE, the Report should be revised to reiterate passage of all species and life stages does not occur passively with tides. Any use of the tidal flux method must be qualified with the uncertainty of not representing passage by some juveniles and adults nor would it consider behavior strategies by any life stage which could affect passage.

The Eulerian Lagrangian-Agent Method (ELAM) and Particle Transport Model (PTM) are examples of numeric modeling used to assess fish passage. ELAM is suited for assessing passage of juvenile and adult fish, whereas PTM is suited for crustaceans and larval fish. Each of these models are directly informed by hydraulic and hydrology (H&H) modeling. Therefore, similar to WVAs, passage modeling has its own uncertainties which are compounded by imprecision associated with H&H modeling. Such uncertainties diminish potential accuracy of projected outcomes. NMFS has suggested passage modeling during previous PDT meetings and the USACE agreed to consider them further, if deemed necessary, during the Preliminary Engineering and Design (PED) phase. Despite the increased rigor provided by numeric passage modeling, such models provide information on passage alone and do not directly translate into quantifiable impacts to fisheries production. NMFS is unaware of numeric fisheries production models that presently have the capability to incorporate passage effects. The Report should be revised to reiterate passage modeling is a means to quantify potential impacts, if determined necessary during PED.

The Report provides the construction acreage and Average Annual Habitat Unit impacts for the Tentatively Selected Plan to marsh. The Report should be revised to provide a breakdown of impacts by each marsh type.

Specific Comments

Page 4, paragraphs two. The Report should be revised to indicate coordination between the USACE, NMFS and other natural resource agencies is necessary throughout post-authorization and PED to update and finalize impacts and develop an adequate mitigation plan.

Page 5, Item 6. The Report should be revised to clarify this item includes refinement of indirect impacts to fisheries based on any changes to features and additional fisheries impact analyses. Such analyses could include numeric fisheries modeling accomplished during PED.

Page 5, Item 8. This item or item 12, j (page 7) is recommended to be amended with the following preliminary guidelines developed from the Greater New Orleans Hurricane Surge Damage Risk Reduction System (HSDRRS): 1) avoid inducing wave refraction/diffraction erosion of existing shorelines; 2) avoid inducing slope failure of existing shorelines; 3) avoid submerged aquatic vegetation; and, 4) avoid inducing hypoxia.

Depending on potential borrow locations, monitoring of dissolved oxygen may be determined to be prudent. If so, it is suggested a monitoring plan be developed and included as recommendations to assess if hypoxia occurs in borrow pits excavated within the estuary (outside navigation channels) as fill to construct marsh mitigation. As listed below, the same monitoring methods are recommended as proposed and conducted by the U.S. Geological Survey for the Mississippi River-Gulf Outlet Ecosystem Restoration Study and Individual Environmental Report 11. Monitoring to determine if hypoxia is a problem may provide information for adaptive management revisions for future planning of borrow pits.

> Measure specific conductance, temperature, dissolved oxygen, and pH in at least one location in the dredge/borrow pit. A calibrated multiparameter probe should be used. The site(s) should be profiled at 5 to 10-ft intervals, depending on depth and conditions, from the lake bottom to the water surface. Samples should be collected one time during each of the months of April, September, and October and twice, about 2 weeks apart, during May, June, July, and August. Sampling frequency should be increased to twice monthly during September and October as necessary.

Page 6, Item 12. A sub item should be added requesting coordination by the USACE with the natural resource agencies to plan, select, site, and design acceptable mitigation. Final scaling of mitigation must occur after determining all direct and indirect impacts to wetlands and other categories of EFH, and revised WVAs are conducted for the mitigation projects based on their final design.

Page 6, Item 12. A sub item should be added indicating if mitigation is not implemented in a concurrent and timely manner, the amount of mitigation necessary should be reassessed and adjusted to offset temporal losses of wetland and EFH functions.

Page 6, Item 12, d. This item recommends assessing mitigation performance using the draft performance criteria used by the USACE and natural resource agencies for HSDRRS. Be advised those criteria are draft and refinement is likely. This item should be revised to indicate final criteria, once developed by the USACE and natural resource agencies, should be used for this project.

Page 6, Item 12, g. Consistent with pending natural resource agency coordination with the USACE, it is recommended this item be amended to clarify the USACE should remain responsible for marsh mitigation until the mitigation is demonstrated to be fully compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria.

Page 8. The list of items requested in the Report to conduct full assessment of indirect project impacts should be supplemented. Presently there is lack of clarity on how often or how long floodgates and environmental water control structures would be closed over the project life under the three sea level rise scenarios. Questions remain unresolved regarding the amount of time preliminarily determined by the FWS, based in part from information provided by the USACE. The Report should be revised to request the USACE provide data and their final determination of the frequency and duration of structure closures throughout the project life for each of the three sea level rise scenarios. The Report should specify that information should be provided to the natural resource agencies at the same time as the Service for review.

An item should be added in the Report requesting fish passage modeling be conducted during PED if determined necessary through continuing coordination with NMFS and the other natural resource agencies. At a minimum this should consist of the PTM. A determination of necessity of passage modeling would consider the usefulness of the H&H model-generated tidal flux data as a surrogate for a more robust analysis.

Other than discussed above, NMFS fully supports the Service positions and recommendations included in the Report. Please continue to coordinate with Patrick Williams of my staff regarding this project.

We appreciate the opportunity to review and comment on this Report.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
EPA, Ettinger
NOD, Behrens, Wilkinson
LA DWF, Bourgeois
F/SER46, Swafford
Files

BOBBY JINDAL
GOVERNOR

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

ROBERT J. BARHAM
SECRETARY

JIMMY L. ANTHONY
ASSISTANT SECRETARY

June 8, 2012

Mr. Jeffrey D. Weller, Supervisor
U.S. Fish and Wildlife Service
646 Cajundome Blvd.
Suite 400
Lafayette, LA 70506

RE: Mississippi River and Tributaries – Morganza to the Gulf of Mexico Louisiana,
Post-Authorization Change Report (DRAFT)

Dear Mr. Weller:

The professional staff of the Louisiana Department of Wildlife and Fisheries (LDWF) has reviewed the above referenced draft Fish and Wildlife Coordination Act Report. Based upon this review, the following has been determined:

> LDWF agrees with the majority of USFWS comments and concerns. We are concerned that the proposed levee system will drastically reduce the ability of estuarine species to enter and exit critical nursery areas. The current draft suggests that these impacts will likely be minimal (pages 26-27); however this is entirely dependent on the types and number of water control structures incorporated into the project design. While it does not appear that the water control structures plans have been finalized, it is our recommendation that a special effort be made to design these structures as large and numerous as possible, with an operational plan that keeps these structures open unless emergency conditions exist (i.e. hurricane). This is essential in order to maintain existing fisheries and estuarine functions. With roads currently serving as a barrier to nursery access in many areas, this project may provide an opportunity to improve/restore hydrologic connectivity to these areas by improving water control structures under roads and could be considered for mitigation credit.

The Louisiana Department of Wildlife and Fisheries appreciates the opportunity to review and provide recommendations to you regarding this proposed activity. Please do not hesitate to contact Habitat Section biologist Steve Beck at 225-765-2956 should you need further assistance.

Sincerely,

Kyle F. Balkum
Biologist Program Manager

sb

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APPENDIX B

DIRECT CONSTRUCTION IMPACTS BY LEVEE REACH AND HABITAT TYPE

Table A-1. Construction impacts of the 100-year alternative under the low SLR scenario.

100-Yr Levee Reach	Fresh Tidal Habitats				INT Tidal Habitats		BR Tidal Habitats		SAL Tidal Habitats		Force Drained (non-tidal)		Total Tidal Water* acres	Total Tidal Marsh acres
	Hwds (acres)	Swamp (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water (acres)		
Barrier	202	547	209	48	0	0	0	0	0	0	0	0	48	209
A	81	13	362	43	0	0	0	0	0	0	0	0	43	362
B	0	0	144	19	39	151	0	0	0	0	0	39	170	182
E-1	0	0	0	0	94	191	0	0	0	0	0	0	191	94
E-2	0	0	0	0	39	216	0	0	0	0	0	4	216	39
F-1	0	0	0	0	84	16	276	78	0	0	0	0	94	359
F-2	0	0	0	0	147	42	0	0	0	0	0	0	42	147
G-1	0	0	0	0	0	0	139	41	0	0	26	0	41	139
G-2	0	0	0	0	0	0	0	0	53	96	0	0	96	53
G-3	0	0	0	0	0	0	0	0	43	29	0	0	29	43
H-1	0	0	0	0	0	0	0	0	112	79	0	0	79	112
H-2	0	0	0	0	0	0	0	0	187	106	0	0	106	187
H-3	0	0	0	0	0	0	0	0	103	119	0	0	119	103
I-1	0	0	0	0	0	0	83	101	0	0	0	0	101	83
I-2	0	0	0	0	0	0	0	0	86	139	0	1	139	86
I-3	0	0	0	0	0	0	0	0	91	144	0	0	144	91
J-1	0	0	0	0	79	216	0	0	2	13	2	1	229	81
J-2	0	0	0	0	0	0	40	300	35	200	28	2	500	75
J-3	0	0	0	0	0	0	0	0	26	123	0	4	123	26
K	0	0	0	0	0	0	139	552	0	0	0	0	552	139
L	0	0	0	0	105	70	107	128	0	0	0	7	197	212
LG	51	0	0	0	30	1	0	0	0	0	0	18	1	30
LL	187	39	89	0	0	0	0	0	0	0	0	3	0	89
TOTAL	520	599	803	110	616	902	783	1,199	736	1,048	57	80	3,260	2,939

Table A-2. Construction impacts of the 100-year alternative under the medium SLR scenario.

100-Yr Levee Reach	Fresh Tidal Habitats				INT Tidal Habitats		BR Tidal Habitats		SAL Tidal Habitats		Force Drained (non-tidal)		Total Tidal Water* acres	Total Tidal Marsh acres
	Hwds (acres)	Swamp (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water (acres)		
Barrier	202	547	209	48	0	0	0	0	0	0	0	0	48	209
A	81	13	361	43	0	0	0	0	0	0	0	0	43	361
B	0	0	144	20	39	151	0	0	0	0	0	39	170	182
E-1	0	0	0	0	94	191	0	0	0	0	0	0	191	94
E-2	0	0	0	0	39	216	0	0	0	0	0	4	216	39
F-1	0	0	0	0	84	16	276	78	0	0	0	0	95	359
F-2	0	0	0	0	147	42	0	0	0	0	0	0	42	147
G-1	0	0	0	0	0	0	139	41	0	0	26	0	41	139
G-2	0	0	0	0	0	0	0	0	53	96	0	0	96	53
G-3	0	0	0	0	0	0	0	0	43	29	0	0	29	43
H-1	0	0	0	0	0	0	0	0	112	79	0	0	79	112
H-2	0	0	0	0	0	0	0	0	186	107	0	0	107	186
H-3	0	0	0	0	0	0	0	0	102	119	0	0	119	102
I-1	0	0	0	0	0	0	83	101	0	0	0	0	101	83
I-2	0	0	0	0	0	0	0	0	86	139	0	1	139	86
I-3	0	0	0	0	0	0	0	0	90	144	0	0	144	90
J-1	0	0	0	0	79	217	0	0	2	13	2	1	229	81
J-2	0	0	0	0	0	0	40	300	34	200	28	2	500	75
J-3	0	0	0	0	0	0	0	0	26	123	0	4	123	26
K	0	0	0	0	0	0	139	552	0	0	0	0	552	139
L	0	0	0	0	105	70	107	128	0	0	0	7	197	212
LG	51	0	0	0	30	1	0	0	0	0	0	18	1	30
LL	187	39	89	0	0	0	0	0	0	0	0	3	0	89
TOTAL	520	599	802	111	616	903	783	1,199	735	1,049	57	80	3,262	2,936

Table A-3. Construction impacts of the 100-year alternative under the high SLR scenario.

100-Yr	Fresh Tidal Habitats				INT Tidal Habitats		BR Tidal Habitats		SAL Tidal Habitats		Force Drained (non-tidal)		Total Tidal	Total Tidal
Levee Reach	Hwds (acres)	Swamp (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water* (acres)	Marsh (acres)	Water (acres)	Water* acres	Marsh acres
Barrier	202	547	208	48	0	0	0	0	0	0	0	0	48	208
A	81	13	361	44	0	0	0	0	0	0	0	0	44	361
B	0	0	143	20	39	151	0	0	0	0	0	39	171	182
E-1	0	0	0	0	94	191	0	0	0	0	0	0	191	94
E-2	0	0	0	0	39	216	0	0	0	0	0	4	216	39
F-1	0	0	0	0	83	17	275	79	0	0	0	0	95	358
F-2	0	0	0	0	146	42	0	0	0	0	0	0	42	146
G-1	0	0	0	0	0	0	138	41	0	0	26	0	41	138
G-2	0	0	0	0	0	0	0	0	52	96	0	0	96	52
G-3	0	0	0	0	0	0	0	0	43	29	0	0	29	43
H-1	0	0	0	0	0	0	0	0	112	79	0	0	79	112
H-2	0	0	0	0	0	0	0	0	186	107	0	0	107	186
H-3	0	0	0	0	0	0	0	0	102	120	0	0	120	102
I-1	0	0	0	0	0	0	82	101	0	0	0	0	101	83
I-2	0	0	0	0	0	0	0	0	86	140	0	1	140	86
I-3	0	0	0	0	0	0	0	0	90	144	0	0	144	90
J-1	0	0	0	0	79	217	0	0	2	13	2	1	230	81
J-2	0	0	0	0	0	0	40	300	34	200	28	2	500	75
J-3	0	0	0	0	0	0	0	0	25	123	0	4	123	25
K	0	0	0	0	0	0	138	553	0	0	0	0	553	138
L	0	0	0	0	105	70	106	128	0	0	0	7	198	212
LG	51	0	0	0	30	1	0	0	0	0	0	18	1	30
LL	187	39	89	0	0	0	0	0	0	0	0	3	0	89
TOTAL	520	599	801	112	614	905	781	1,201	733	1,052	57	80	3,270	2,928

APPENDIX C

Structure Operation Plan

March 6, 2013

Morganza to the Gulf of Mexico, Louisiana Water Control Structure Operations Plan

Note: The following operation plans are preliminary for the purpose of assessing potential adverse indirect impacts of the proposed Federal project. Operation plans will be further refined during Preconstruction Engineering and Design and in future NEPA documents.

Group 1 contains the constructible features; all other groups contain programmatic features. The HNC lock/floodgate complex also has a salinity trigger which is described below the table.

No structure can be closed or re-opened when the pressure head differential exceeds the structure design capability. No structure can be re-opened until storm force winds have dropped to a level safe for personnel to access the area and operate the machinery.

Flood Closure Criteria

The following group of structures…	…cannot be closed until the following conditions are met:	…and can only be re-opened if the following conditions are met:
Group 1: Bayou Grand Caillou HNC lock and floodgate	1. A NHC watch is issued for the area, AND 2. The stage measured at the gate location reaches +2.5 ft NAVD88.	1. The NHC watch has been discontinued for the area, AND 2. Stages on the outside of the structures drop below +2.5 ft NAVD88, AND The NHC small craft advisory no longer applies to the area and the channel has been cleared of obstructions so that navigation can safely resume.
Group 2: ECS in Reaches G and H Bayou Four Points ECS #3 (new) in Reach J All ECS and navigable gates in Barrier Reach GIWW West of Houma Minors Canal Bayou Lafourche GIWW East at Bayou Lafourche ECS in Larose to Lockport	1. A named storm is in the Gulf and threatening the Louisiana coast, OR 2. The stage measured at the gate location reaches +3.0 ft NAVD88.	1. Stages on the outside of the structures drop below +3.0 ft NAVD88, AND 2. The NHC small craft advisory no longer applies to the area and the channel has been cleared of obstructions so that navigation can safely resume.

The following group of structures…	**…cannot be closed until the following conditions are met:**	**…and can only be re-opened if the following conditions are met:**
Reach		
Group 3: Marmande Canal Bayou Dularge Falgout Canal Bayou Petite Caillou Bayou Terrebonne Humble Canal Grand Bayou Bayou Pointe Aux Chenes Placid Canal Bush Canal	1. A named storm is in the Gulf and threatening the Louisiana coast, OR 2. The stage measured at the gate location reaches +2.5 ft NAVD88.	1. Stages on the outside of the structures drop below +2.5 ft NAVD88, AND 2. The NHC small craft advisory no longer applies to the area and the channel has been cleared of obstructions so that navigation can safely resume.
Group 4: ECS in Reaches E, K, & L	These structures are flap gates that allow for continuous one way flow/drainage.	
Group 5: ECS #1 (existing) and #2 (existing) in Reach J	These structures will be managed according to current LA Wildlife and Fisheries Permit.	According to current LA Wildlife and Fisheries Permit.

[1] An announcement that tropical-storm conditions are possible within the specified area (includes tropical depressions). Because outside preparedness activities become difficult once winds reach tropical storm force, watches are issued 48 hours in advance of the anticipated onset of tropical-storm-force winds.

NHC = National Hurricane Center. ECS = Environmental Control Structures

Salinity Trigger for the HNC lock and floodgate:

The HNC lock and floodgate will be closed for salinity control only if:

1. Flows in the Atchafalaya River flows are below 100,000 cfs as measured on the Simmesport gage (USGS 07381490 Atchafalaya River at Simmesport, LA) or
2. If a gage on the outside of the HNC Lock complex exceeds a salinity value that has been correlated with preventing exceedance of the maximum allowable chloride level of 250 ppm as defined in EPA's secondary drinking water standard at the Houma Treatment Plant. The structure should be closed for at least 12 hrs and fluctuations in chloride levels should be monitored and recorded hourly. This to be determined salinity value at the new gage should correlate with the value of 7.5 ppt measured at the HNC at Dulac monitoring station. The 7.5 ppt trigger will be used to perform the indirect impact analysis in this document. Once the new trigger is established the impact analysis will be redone to verify the assumptions made.

The HNC lock complex may be opened when all of the following additional criteria have been met (The lock may be used for navigation, as soon as the hurricane and small craft warning no longer apply to the project area, and the channel has been cleared of obstructions. This may occur before the next two criteria are met):

1. The differential between the interior water level and exterior water level is equal to or less than the +1.0 feet as measured on the upstream and downstream staff gage respectively.
2. After monitoring chloride levels over the 12 hour period at the new gage on the outside of the HNC Lock complex drops below the salinity closure trigger described above. For the analysis of indirect impacts a salinity level of 13 ppt as measured near Cocodrie (LUMCON Station) will be used. The LUMCON station replaces the Bayou Grand Caillou USACE 76305 from the 2002 feasibility report because it has a more robust dataset. If the USACE re-evaluates the salinity trigger at the LUMCON station and comes up with a trigger different than 13ppt, this trigger may change. Once the new trigger is established the impact analysis will be redone to verify the assumptions made.

APPENDIX D

TWELVE REQUIRMENTS FOR MITIGATION PLANNING

(from the U.S. Army Corps of Engineers & EPA 2008 Final Mitigation Rule in the FEDERAL REGISTER Vol. 73, No. 70, April 10, 2008)

Twelve Requirements for a Compensatory Mitigation Plan

1. Objectives. A description of the resource type(s) and amount(s) that will be provided, the method of compensation (restoration, establishment, preservation etc.), and how the anticipated functions of the mitigation project will address watershed needs.

2. Site selection. A description of the factors considered during the site selection process. This should include consideration of watershed needs, onsite alternatives where applicable, and practicability of accomplishing ecologically self-sustaining aquatic resource restoration, establishment, enhancement, and/or preservation at the mitigation project site.

3. Site protection instrument. A description of the legal arrangements and instrument including site ownership, that will be used to ensure the long-term protection of the mitigation project site.

4. Baseline information. A description of the ecological characteristics of the proposed mitigation project site, in the case of an application for a DA permit, the impact site. This may include descriptions of historic and existing plant communities, historic and existing hydrology, soil conditions, a map showing the locations of the impact and mitigation site(s) or the geographic coordinates for those site(s), and other characteristics appropriate to the type of resource proposed as compensation. The baseline information should include a delineation of waters of the United States on the proposed mitigation project site. A prospective permittee planning to secure credits from an approved mitigation bank or in-lieu fee program only needs to provide baseline information about the impact site.

5. Determination of credits. A description of the number of credits to be provided including a brief explanation of the rationale for this determination.
    - For permittee-responsible mitigation, this should include an explanation of how the mitigation project will provide the required compensation for unavoidable impacts to aquatic resources resulting from the permitted activity.
    - For permittees intending to secure credits from an approved mitigation bank or in-lieu fee program, it should include the number and resource type of credits to be secured and how these were determined.

6. Mitigation work plan. Detailed written specifications and work descriptions for the mitigation project, including: the geographic boundaries of the project; construction methods, timing, and sequence; source(s) of water; methods for establishing the desired plant community; plans to control invasive plant species; proposed grading plan; soil management; and erosion control measures. For stream mitigation projects, the mitigation work plan may also include other relevant information, such as planform geometry, channel form (e.g., typical

channel cross-sections), watershed size, design discharge, and riparian area plantings.

7. Maintenance plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

8. Performance standards. Ecologically-based standards that will be used to determine whether the mitigation project is achieving its objectives.

9. Monitoring requirements. A description of parameters monitored to determine whether the mitigation project is on track to meet performance standards and if adaptive management is needed. A schedule for monitoring and reporting monitoring results to the DE must be included.

10. Long-term management plan. A description of how the mitigation project will be managed after performance standards have been achieved to ensure the long-term sustainability of the resource, including long-term financing mechanisms and the party responsible for long-term management.

11. Adaptive management plan. A management strategy to address unforeseen changes in site conditions or other components of the mitigation project, including the party or parties responsible for implementing adaptive management measures.

12. Financial assurances. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Other information. The DE may require additional information as necessary to determine the appropriateness, feasibility, and practicability of the mitigation project.

Appendix C

CLEAN WATER ACT
SECTION 404(b)(1) ASSESSMENT

SECTION 404(b)(1) EVALUATION

Mississippi River and Tributaries
Morganza to the Gulf of Mexico, Louisiana Project

Terrebonne Parish, Louisiana

Revised Programmatic Environmental Impact Statement

I. Project Description

a. Location. The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche (**Figure 1**). The study area extends south to the saline marshes bordering the Gulf of Mexico and encompasses approximately 1,900 square miles. The 404(b)(1) short form prepared for the previously constructed first lift of J1 and the Revised Draft Programmatic Environmental Impact Statement prepared for this project are here in incorporated by reference.

b. General Description. 1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative) provides risk reduction for water levels that have a 1% chance of occurring each year (see figure). This alternative includes programmatic elements that would be further investigated in the future and constructible elements for which this consistency determination would serve as the required documentation for the Coastal Zone Management Act. The features that have been to be identified as constructible include, the first lift of Levee Reach F1 and F2, Levee Reach G1, Houma Navigation Canal Lock Complex (HNC Lock), and Bayou Grand Caillou Floodgate (BGC floodgate).

The 98-mile levee system would extend from high ground along US 90 near the town of Gibson and tie into Hwy 1 near Lockport, LA in Lafourche Parish. Planned levee elevations range from 15.0 to 26.5 feet NAVD88. Toe-to-toe levee widths range from 282 feet to 725 feet. It will take several levee lifts to reach these dimensions. Twenty-two navigable floodgate structures, ranging in elevation from 17.0 to 33 feet (NAVD88), would be located on waterways throughout the levee system, including a lock complex on the HNC. Additionally, environmental water control structures would allow tidal exchange at 23 locations through the levee through sluice gates and box culverts. Approximately 84 miles of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers.

Nine road gates would be located at the following levee/road crossings: NAFTA, Four Pointe Road, Highway 315 (DuLarge), Highway 55, Highway 56, Highway 24, Highway 3235, Union Pacific RR, and Highway 665. Fronting protection would be provided for four pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), and Hanson Canal pump stations.

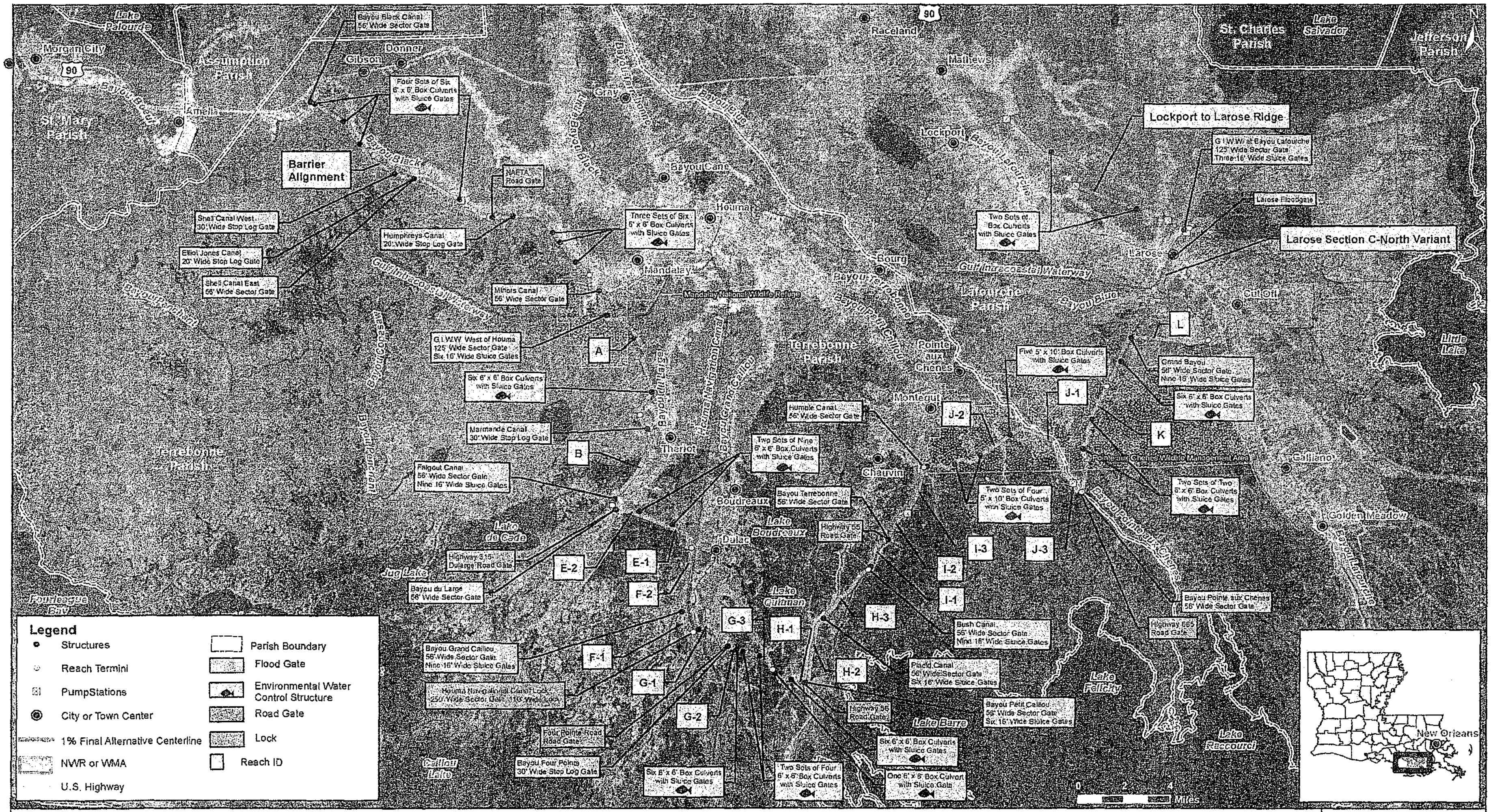


Figure 1. ALIGNMENT AND STRUCTURES OF THE
1% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE RISK REDUCTION SYSTEM ALTERNATIVE
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants
Figure: 1
Date: June 2012
Scale: 1:256,000
Source: USACE/GEC
Map ID. 273160010-2811

Levees would be constructed using a combination of side-cast and hauled-in borrow materials. Adjacent sidecast was planned for the pre-load section only. Borrow pits are oversized to offset the potential for encountering organics, expected losses, etc. Structures on Federally maintained navigation channels include the Houma Navigation Canal Lock Complex (and 250-ft sector gate) and two 125-ft sector gates on the GIWW east and west of Houma. In addition, thirteen 56-ft sector gates and five 20- to 30-ft stop log gates are located on various waterways that cross the levee system.

The constructible features would directly impact intermediate and brackish marsh, while the programmatic features have the potential to directly impact bottomland hardwoods, swamp, fresh, intermediate, brackish, and saline marsh. Approximately 126 million cubic yards of earthen material (quality based Hurricane Storm Damage Risk Reduction System (HSDRRS) Guidelines) would be used to build the complete levee alignment to its full height.

Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh and open water are within the indirect impacts area for the constructible features (**Figure 2**).

To mitigate for the indirect impacts approximately 1,765 acres of marsh will be created from dredged material. Most of this material will come from the construction of the lock complex and the by-pass channel. A total of approximately 2,690 acres of wetland will be created for both the direct and indirect impacts. Most of this material will come from the organic overburden in the adjacent borrow pits to the levee reaches and from the area of the construction of the lock complex and the by-pass channel.

The proposed action itself consists of measures to minimize the adverse effects of storm water erosion and thus requires no separate measures or controls for compliance with Clean Water Act Section 402(p) and LAC 33:IX.2341.B.14.j.

c. Authority and Purpose. The study is authorized by: House Resolution, Docket 2376, April 30, 1992; and WRDA 96 (PL 104-303, Sec 425) the Energy and Water Development Appropriation Act of 1995 (PL 103-316), Section 425 of WRDA 96 (PL 104-303), Section 158 of the Energy and Water Development Appropriations Act, 2004 (PL 108-137), and Section 1001 of WRDA 2007 (Public Law 110-114) authorized construction for the project for:

> *hurricane and storm damage reduction, Morganza to the Gulf of Mexico, Louisiana: Reports of the Chief of Engineers dated August 23, 2002, and July 22, 2003, at a total cost of $886,700,000, with an estimated Federal cost of $576,355,000 and an estimated non-Federal cost of $310,345,000. The operation, maintenance, repair, rehabilitation, and replacement of the Houma Navigation Canal lock complex and the Gulf Intracoastal Waterway floodgate features of the project described in subparagraph (A) that provide for inland waterway transportation shall be a Federal responsibility in accordance with section 102 of the Water Resources Development Act of 1986 (33 U.S.C. 2212).*

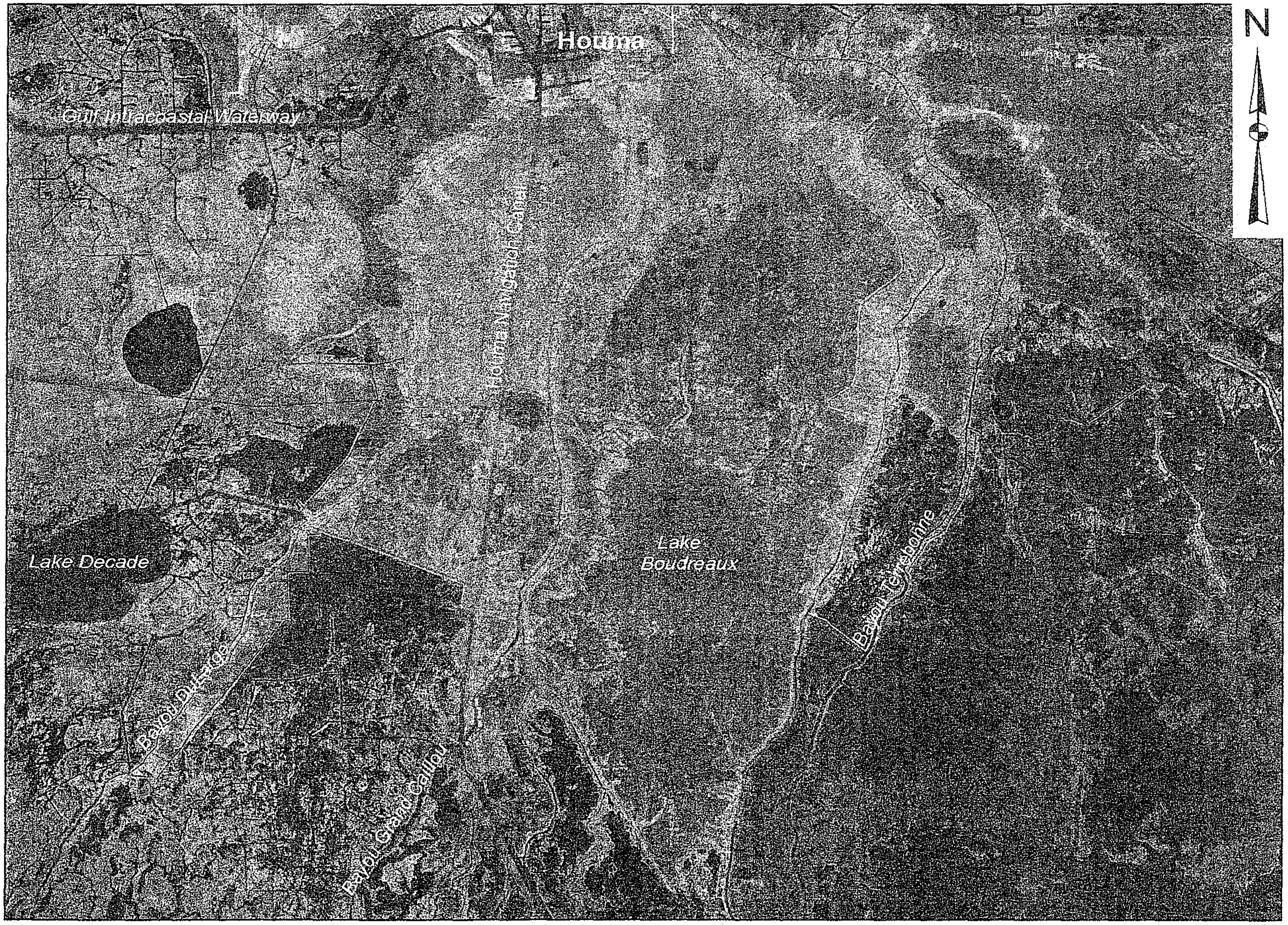


Figure 2. Indirect impacts area for constructible project features.

project footprint to either upland terrain or wetland habitat (with the exception of areas where habitat type will not change). In total, the project would directly impact 3,286 acres of open water habitat, 4,364acres of wetland habitat, and 6,336 acres of upland habitat.

Reach	Reach Length (Miles)	Crown Elevation (ft NAVD88)	Base Elevation (ft NAVD88)	Crown Width (ft)	Levee Width (Not Including Berm) (ft)	Total Levee Width (ft)	Levee Side Slope (Protected Side)	Levee Side Slope (Flood Side)	Berm Side Slopes (Protected Side)	Berm Side Slopes (Flood Side)
A/Barrier Alignment	15.7/8.18	22	-1	10	82	329	1V:4H	1V:4H	1V:10H; 1V:3H at Toe	1V:15H; 1V:6H at Toe
B	5.07	20.5	-2	10	64	520	1V:4H	1V:4H	1V:26H; 1V:4H at Toe	1V:15H; 1V:30H; 1V:5H at Toe
E	4.66	25	-1	10	88	725	1V:4H	1V:4H	1V:29H; 1V:3H at Toe	1V:15H; 1V:25H; 1V:5H at Toe
F	4.04	25	0.5	10	89	480	1V:4H	1V:4H	1V:20H; 1V:4H at Toe	1V:13H; 1V:6H at Toe
G	5.72	26	-1	10	95	550	1V:4H	1V:4H	1V:19H; 1V:6H at Toe	1V:19H; 1V:6H at Toe
H1	1.95	25.5	-1	10	96	435	1V:4H	1V:4H	1V:17.5H; 1V:6H at Toe	1V:15H; 1V:6H at Toe
H2/H3	2.58/3.43	28	-2	10	104	500	1V:4H	1V:4H	1V:23H; 1V:6H at Toe	1V:15H; 1V:6H at Toe
I	5.70	28	-1	10	110	425	1V:4H	1V:4H	1V:24H; 1V:4H at Toe	1V:15H; 1V:4H at Toe
J1/J2	3.14/4.89	28	-1	10	101	654	1V:4H	1V:4H	1V:21H; 1V:4H at Toe	1V:15H; 1V:6H at Toe
J3	1.31	28	-1	10	90	740	1V:4H	1V:6H	1V:20H; 1V:5H at Toe	1V:20H; 1V:4H at Toe
K/L	5.04/5.90	26	0	10	94	644	1V:4H	1V:4H	1V:21H; 1V:11H at Toe	1V:25H; 1V:10H at Toe

Levee Reaches: As several thousand acres within the footprint of the proposed levee alignment consist of open water or wetland habitat, placement of dredged or fill material for levee construction would convert these areas to upland habitat. **Table 1** depicts final pre-settlement levee dimensions for the proposed project. Levees would be constructed in a total of four lifts for all reaches except for reach G, which will be constructed in three lifts. Variable and sometimes large time intervals (4-35 years) would separate lift cycles. Further levee lift schedule information is available in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix.*

Table 1 – Proposed pre-settlement levee dimensions by reach*

* Dimensions of the Larose to Lockport Ridge and Larose Section C-North Variant levees will be determined in later phases of the project and included in a separate 404(b)(1) assessment.

Mitigation Sites: Approximately 4,364acres of wetlands, including marsh, swamp, and bottomland hardwood habitats, are to be constructed for mitigation associated with direct loss of wetland habitat from levee construction. A portion of this mitigation would consist of construction of 1,175 acres of marsh habitat using the top 5 ft of borrow material from adjacent borrow areas associated with initial levee lifts.

To mitigate for the indirect impacts approximately 1,765 acres of marsh will be created from dredged material. Most of this material will come from the construction of the lock complex and the by-pass channel. A total of approximately 2,690 acres of wetland will be created for both the direct and indirect impacts. Most of this material will come from the organic overburden in the adjacent borrow pits to the levee reaches and from the area of the construction of the lock complex and the by-pass channel.

In accordance with CWPPRA program marsh creation assumptions, dredged material would be mechanically placed in confined marsh creation sites to an initial construction elevation of +2.5 ft NAVD88, and would be expected to settle to elevations ranging between the initial construction elevation and +1.37 ft NAVD88 after initial placement. Confinement dikes would be constructed to +3.0 ft NAVD88. Typical side slopes for confinement dikes used for marsh creation are 1V:3H. In general, mitigation sites associated with adjacent levee borrow areas would be constructed on the flood side of the proposed alignment; while a majority of these sites appear to be predominantly sites where historical marsh loss has occurred, some sites include existing marsh as well as natural bayous. In many cases, mitigation sites associated with adjacent levee borrow areas are situated directly adjacent to these borrow areas. Details regarding mitigation site locations and footprints are available in the *Morganza to the Gulf of Mexico, Louisiana Revised Programmatic Environmental Impact Statement.*

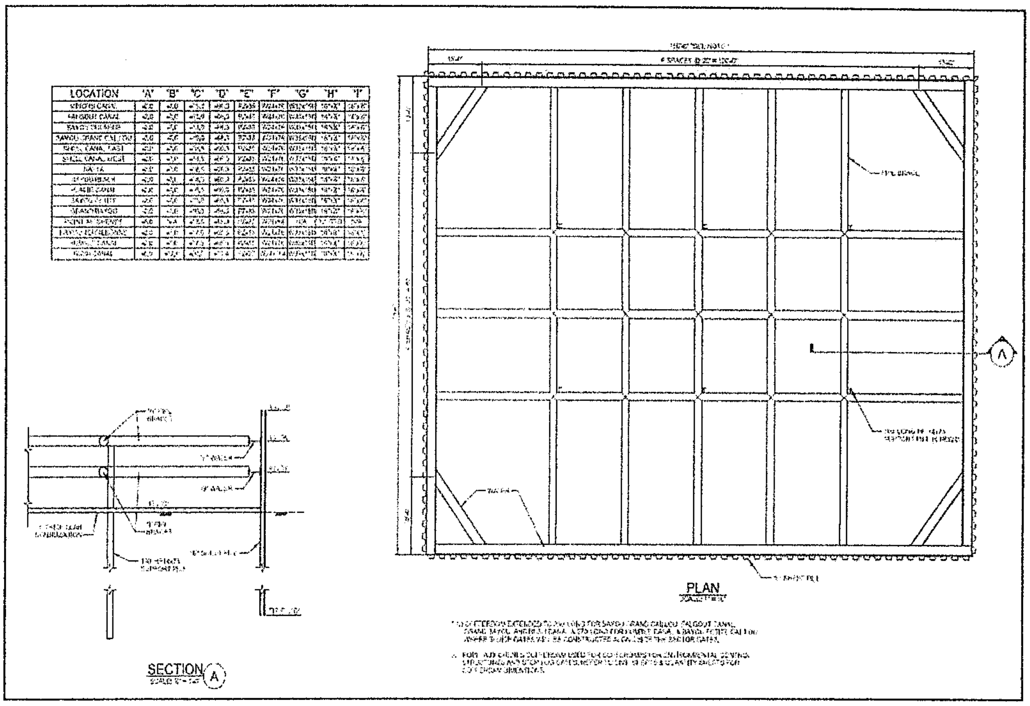
Structures: The proposed project includes a navigation lock, twenty two (22) navigable floodgates, twenty three (23) environmental control structures, nine (9) road gates, and fronting protection for four (4) existing pump stations. **Table 2** identifies the various floodgates included in the proposed project. Cofferdams would be utilized to construct floodgates in the dry; conceptual cofferdam dimension have been established for most floodgates included in the proposed project (**Figure 3**). More information concerning floodgates and floodgate construction can be found in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix.*

Table 2 – Navigable floodgates included in the proposed project*

Reach	Waterway	Structure Design Size/Type	Design Elevation (ft NAVD88)
Barrier	Bayou Black	56-ft sector gate	22
	Shell Canal West	30-ft stop log gate	23.5
	Shell Canal East	56-ft sector gate	23.5
	Elliot Jones Canal	20-ft stop-log gate	23.5
	Humphreys Canal	20-ft stop-log gate	23.5
A (north of GIWW)	Minor's Canal	56-ft sector gate	23
A	GIWW West (at Houma)	125-ft sector gate	23
B	Marmande Canal	30-ft stop-log gate	23
	Falgout Canal	56-ft sector gate	23
E-2	Bayou Du Large	56-ft sector gate	25.5
F-1	Bayou Grand Caillou	56-ft sector gate	25.5
G-1	HNC	250-ft sector gate and lock	30.5
G-2	Four Point Bayou	30-ft stop-log gate	30
H-1	Bayou Petit Caillou	56-ft sector gate	30.5
H-2	Placid Canal	56-ft sector gate	31.5
H-3	Bush Canal	56-ft sector gate	33
I-1	Bayou Terrebonne	56-ft sector gate	33
I-3	Humble Canal	56-ft sector gate	33
J-3	Bayou Pointe aux Chenes	56-ft sector gate	33
L	Grand Bayou	56-ft sector gate	29.5
L*	GIWW East (at Larose)	125-ft sector gate	21.5

* Dimensions of the Larose to Lockport Ridge and Larose Section C-North Variant structures will be determined in later phases of the project and included in a separate 404(b)(1) assessment.

Figure 3 – Proposed cofferdam dimensions for select floodgates



Construction of floodgates will also include excavation of material for structural excavation and bypass channel construction. Up to 200,000 cubic yards of material will be excavated for each structure. At this time, disposal of this material has not been resolved.

Environmental control structures consist of box culverts and sluice gates allowing tidal exchange. Culvert dimensions are either 6 ft x 6 ft or 5 ft x 10 ft. Between one (1) and nine (9) box culverts would be included at each environmental control structure. Construction of environmental control structures will also include excavation of material for structural purposes. Up to 18,000 cubic yards of material will be excavated for each structure. At this time, disposal of this material has not been resolved.

Six (6) roadway gates would be constructed along the alignment at LA Highway 182 (Bayou Black Drive), LA Highway 315 (Bayou Du Large Road), Four Point Road, LA Highway 56, LA Highway 55, LA Highway 665 (Point Aux Chenes Road), and a private road on NAFTA property. All roadways would have a swing gate, except LA 182 which would have a ramp. For LA 182, alternate access for locals will need to be made available during the construction of the earthen ramp, which will need to be raised each time the levee is raised. The features associated with construction of each roadway gate structure are a steel swing gate, concrete monolith, and traffic control devices.

Fronting protection is provided for eight (8) pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), and Hanson Canal pump stations. Features associated with the construction of fronting protection include T-walls and butterfly gate valves as shown in figure 5-4. All fronting protections would be constructed on the flood side of the existing protection. Based on site visits, the discharge pipes extend far enough that additional pipes are not needed. Butterfly valves would be opened to allow pumping discharge for interior drainage or closed to prevent backflow during storm conditions. Construction of fronting protection will also include excavation of material for structural purposes. Up to 21,000 cubic yards of material will be excavated for fronting protection associated with each pump station. At this time, disposal of this material has not been resolved.

Constructible Features

Levee Reaches (F and G-1): See discussion of programmatic features for levee dimensions for reaches F and G-1. For these reaches, conventional, land-based construction would be utilized. Therefore, there will be no placement of dredged or fill material within surface waters for construction of these levee reaches apart from actual levee construction.

Houma Lock Complex: The largest structure in the Morganza to the Gulf project is the HNC lock complex, which consists of a 110-ft wide by 800-ft long lock with an adjacent 250-ft wide floodgate. The lock complex has a +30.5 ft NAVD88 top elevation and a -18.0 ft NAVD88 sill elevation.

Figure 2 is a conceptual drawing of the HNC lock complex. Features shown in the figure appear in bold in the following text:

- The HNC lock complex is generally oriented in a north-south direction approximately 3,000 ft south of the intersection of the HNC with Bayou Grand Caillou and is located in a bypass channel adjacent to the HNC on its west side.
- The lock structure consists of two lock gate monoliths (gulf side lock gates and inland lock gates), which house two sets of sector gates, and five U-frame lock chamber monoliths. A floodgate monolith adjoins the gulf side lock gate monolith and houses a sector gate, which is separated from the gulf side lock gates to the west by 59 ft. The five lock monoliths and the floodgate monolith are made of cast-in-place, reinforced concrete, and are pile supported.
- T-walls extend from both sides of the lock and floodgate to tie into the proposed Morganza to the Gulf hurricane system at levee reach F-1 to the west and levee reach G-1 to the east, transitioning to levee elevations +23.5 and +24 ft NAVD88 (in year 2085), respectively. Within the T-walls, there are a total of ten 5-ft wide by 10-ft high sluice gates—four between the floodgate and Levee Reach F-1, two between the lock and floodgate, and four between the lock chamber and closure dam.
- A closure dam closes the existing HNC channel near the confluence of Bayou Platte and the HNC. The dam is underlain by a grid of soil-cement columns installed with the dry method of deep-soil mixing. The closure dam is a rock dam constructed to elevation +8.0 ft NAVD88 with a T-wall on top that provides

protection to elevation +30.5 ft NAVD88.

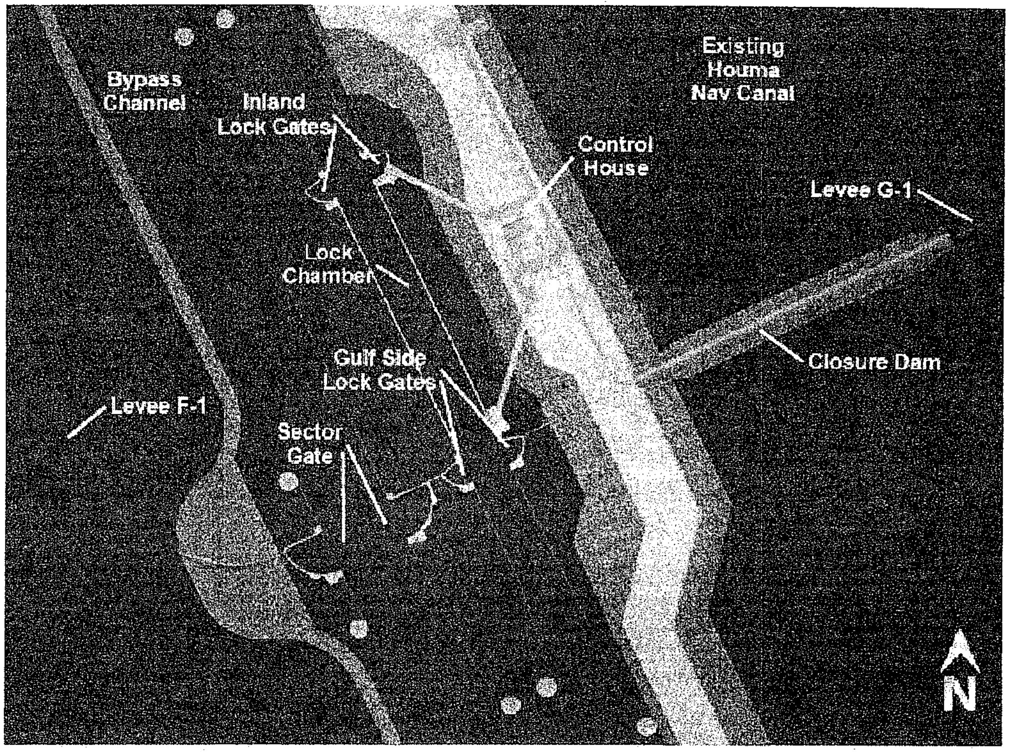


Figure 2 -Conceptual Drawing of the HNC Lock Complex

As with other navigable floodgate structures included in the project, a cofferdam would be constructed to allow for lock construction in the dry.

Bayou Grand Calliou Floodgate: The Bayou Grand Calliou Floodgate is a 56-ft sector gate. This sector gate would be constructed to elevation +25.5 ft NAVD88. As mentioned in discussion of programmatic features, a cofferdam would be constructed for this feature to allow for construction in the dry (**Figure 1**).

Construction of the Bayou Grand Calliou will also include excavation of material for structural excavation and bypass channel construction. Approximately 35,000 cubic yards of material will be excavated for the floodgate. At this time, disposal of this material has not been resolved.

(2) Sediment Type

Programmatic Features

The surface and shallow subsurface of the project area is generally comprised of natural levee, swamp, and marsh deposits. Natural levee deposits are at the surface and underlie marsh and swamp deposits and occur adjacent to abandoned courses and distributaries. Natural levee deposits generally consist of soft to stiff clays interbedded with layers and lenses of silt and silty sand. Natural levee deposits vary in thickness but generally range from 5 to 20 feet. Swamp and marsh deposits are located adjacent to natural levee deposits and comprise most of the land area in the project area. They consist mainly of very soft to medium, organic clays, with lenses of soft to medium lean clay, peat, silt, and silty sand. Swamp deposits contain wood. These deposits generally range from 5 to 20 feet thick. Interdistributary deposits underlie marsh, swamp, and natural levee deposits and consist of soft to medium clay interbedded with layers and lenses of very soft to medium lean clay, silt, and silty sand and occasional lenses of shell. Interdistributary deposits generally range from 80 to 120 feet thick. Swamp deposits are also frequently interbedded with interdistributary deposits. Intradelta deposits underlie marsh, swamp, and natural levee deposits and are interbedded with interdistributary deposits. Intradelta deposits are associated with delta progradation and are found adjacent to abandoned courses and major distributaries. Intradelta deposits consist of silt, silty sand and sand with occasional layers and lenses of soft to medium, fat and lean clays. Intradelta deposits vary in thickness but average 10 feet thick.

Levee Reaches: Borrow material for the first lift will be obtained from adjacent borrow areas for all levee reaches except **Reach A**. For all other lifts, borrow material will be obtained from approved offsite borrow sources.

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.

Soil and geologic profiles conducted along the proposed levee alignment indicate a majority of soils consist of CH and CL, with interspersed lenses of silt and sand. A majority of adjacent borrow material is therefore anticipated to meet HSDRRS guidelines for levee grade material.

Mitigation Sites: The topmost 5 feet of material from borrow areas adjacent to the proposed levee alignment would be used for creation of 1,175 acres of marsh. As material is highly organic, placement of material will result in a layer of highly organic sediments of varying thickness underlain primarily by swamp and marsh deposits consisting of CH and CL.

Structures: 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 stated earlier, a majority of soils in the project area can be classified as either CH or CL. Offiste borrow material would be required to meet HSDRRS guidelines for levee grade material.

Constructible Features
Levee Reaches (F and G-1): Borrow material for these levee reaches would be derived from HNC lock and bypass channel excavation. The soil and geologic profile conducted nearest to the bypass channel (Reach G-1) indicates a majority of soils within 20 feet of the surface consist of CH and CL, with interspersed lenses of silt and sand. A majority of borrow material associated with HNC lock and bypass channel excavation is therefore expected to meet HSDRRS guidelines for levee grade material.

Houma Lock Complex: Material used in lock construction would either consist of backfill from adjacent areas or offsite borrow. Adjacent backfill characteristics would be dependent on location and depth; however,, a majority of soils in the vicinity of the lock complex can be classified as either CH or CL. Offsite borrow material would be required to meet HSDRRS guidelines for levee grade material.

Bayou Grand Caillou Floodgate: Material used in construction of the Bayou Grand Caillou Floodgate would either consist of backfill from adjacent areas or offsite borrow. Adjacent backfill characteristics would be dependent on location and depth; however,, a majority of soils in the vicinity of the lock complex can be classified as either CH or CL. Offsite borrow material would be required to meet HSDRRS guidelines for levee grade material.

(3) Dredged/Fill Material Movement

(All Features)
Levee Reaches: 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.

Mitigation Sites: Because mitigation sites would include confinement dikes, no lateral movement of dredged material is anticipated.

Structures: Structure materials and any associated cofferdams would not be expected to move or shift after final placement.

(4) Physical Effects on Benthos (burial, changes in sediment types, etc)

(All Features)
Sessile aquatic organisms within the footprint of project features would be smothered by dredged and fill materials. For structures and levees, because these sites will be converted to terrestrial habitat, these organisms would not reestablish. For mitigation areas, organisms adapted to survival in marsh vegetation would establish. Following cofferdam removal, aquatic organisms formerly present within the footprint of cofferdams would reestablish in areas within the footprint which still consist of aquatic habitat.

(5) Other Effects

(6) Actions Taken to Minimize Impacts:

(All Features)
Confinement dikes and berms would be used to prevent lateral movement of dredged or fill material during construction activities.

b. Water Circulation, Fluctuation, and Salinity Determinations

(1) Water

(a) Salinity

(All Features)
Prediction of impacts to salinities within the Terrebonne estuary was performed using a TABS-MDS model simulating with- and without-project salinities, water levels, and water velocities; a summary of model results is available in the modeling report *Comparison of Plan Alternatives for the Morganza to the Gulf of Mexico Levee System.* Globally in the project area, salinity changes are expected to be less than 1 part per thousand (ppt) with the largest changes occurring in the areas to the north and south of the HNC Lock when complex when it is closed (Plan 3 in the model report), and south of the Falgout Canal and north of Point Aux Chene when environmental structures are in the open position (Plans 1 and 3 in the model report). The addition of environmental water control structures along Falgout Canal allow new freshwater inflow to the area south of the canal, which in turn reduces the salinity (about 3 ppt on average), with the largest reduction occurring during the winter months and minimal reduction occurring during the summer months. The Falgout Canal and Lake Boudreaux areas would be freshened as the closed HNC structure forces the freshwater flow to divert along other avenues, thereby freshening the surrounding areas. Addition of environmental water control structures near Point aux Chenes appears to introduce higher salinity waters to the area north of the proposed levee alignment irrespective of seasonality. During closure of the HNC Complex, salinity

will increase in the area to the south of the Complex, while salinity intrusion to inland areas via the HNC would be reduced.

With the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes to salinity in the Terrebonne estuary resulting from the project may be more significant than those predicted through modeling.

Because bypass channels would be constructed prior to construction of cofferdams for navigable floodgates, and therefore impacts to water circulation for adjacent waters during construction would be minimized, no significant impacts to salinity are anticipated as a result of cofferdams.

(b) Water Chemistry (pH, etc.)

Programmatic Features
Dredging and placement may result in short term effects on pH. Factors typically associated with dredging 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.

Ambient pH values in the project area range between 6.27 and 8.7, with an average of 7.6

The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in pH within the study area.

With the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes in pH levels within the study area may become significant. For example, more frequent closure of structures could lead to a greater level of influence of Atchafalaya River water north of the proposed levee alignment. Because the river water contains high alkalinity and elevated nutrient levels, pH levels in this area may increase directly or through eutrophication.

Levee Reaches: 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 water bodies. Associated impacts to the water column from placement of levee fill material would therefore be localized and temporary.

Mitigation Sites: Effluent discharges from mitigation sites would result in a temporary reduction in pH for adjacent waters. The tidal action in the vicinity of mitigation sites would help to reduce pH effects by dispersing and diluting mitigation site effluent waters. As emergent wetland vegetation establishes at sites, pH levels would return to normal.

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.

(c) Clarity

(All Features)
Placement of dredged or and fill material is expected to result in localized turbidity plumes, which would affect water clarity. Following completion of construction activities, the occurrence of these turbidity plumes would no longer occur.

(d) Color

(All Features)
Placement of dredged or and fill material is expected to result in localized turbidity plumes, which would affect water color. Following completion of construction activities, the occurrence of these turbidity plumes would no longer occur.

(e) Odor

(All Features)
Placement of adjacent borrow area sediments will result in the exposure of previously undisturbed, organic and reduced sediments, which is expected to result in an odor which would persist until material is dewatered for levee construction or until emergent wetland vegetation establishes at mitigation sites. No significant odors are anticipated to be associated with offsite borrow material or any other construction materials.

(f) Taste

(All Features)

The nearest potable water intake (via surface water route) to any feature along the proposed levee alignment is approximately 6 miles. Any possible effects of construction activities for project features would be expected to diminish long before reaching the closest municipal water intake.

(g) Dissolved Gas Levels

(All Features)
Short-term decreases in dissolved oxygen could occur due to introduction of organics from the sediment into the water column, as well as the release of nutrients. Turbidity affects water quality in several ways, one which may markedly affect dissolved oxygen levels. The introduction of nutrients and organic material to the water column as a result of the discharge 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. Adjacent borrow area sediment is highly organic, and therefore there is potential for temporarily lowering dissolved oxygen levels at mitigation sites.

Ambient dissolved oxygen values in the project area range between 0.2 and 12.5 mg/L, with an average of 6 mg/L. As discussed in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix,* low dissolved oxygen level is the most commonly cited suspected cause of impairment for study area waterbodies. Citation of dissolved oxygen as a suspected cause of impairment occurred disproportionately on the protected side of the proposed levee alignment. The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in dissolved oxygen levels within the study area.

In addition, with the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes to dissolved oxygen levels within the study area may be more significant. For example, more frequent closure of structures could lead to the stagnation of low dissolved oxygen waters present to the north of the proposed alignment.

Levee Reaches: 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.

Mitigation Sites: Because of the high organic carbon content of sediment from the borrow areas, the discharge of dredged material for marsh creation at mitigation sites may have a short-term impact on dissolved oxygen levels for effluent waters discharging from the confines of sites. In addition, there is a possibility that dissolved oxygen effects related to the release of ammonia from borrow area sediment pore water could occur. Because mitigation sites are highly tidally influences, it is anticipated that effluent waters would be quickly dispersed and diluted.

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.

(h) Nutrients

(All Features)
As discussed in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix,* elevated nutrients are a commonly cited suspected cause of impairment for study area waterbodies. Citation of nutrients, total phosphorus, and nitrate/nitrite as a suspected cause of impairment occurred disproportionately on the protected side of the proposed levee alignment. The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in the distribution of nutrients within the study area.

With the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes to nutrient levels within the study area may be more significant. For example, more frequent closure of structures could lead to a greater level of influence of Atchafalaya River water north of the proposed levee alignment while preventing flushing of this same area with estuarine waters. Because the river water contains elevated nutrient (particularly nitrate) levels, nutrient concentrations in this area may increase directly.

Levee Reaches: 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.

In addition, because fill material associated with levee construction is anticipated to be dewatered prior to placement, it would be relatively free of ammonia commonly associated with sediment pore water. Therefore, placement of fill material during structure construction is not anticipated to significantly impact nutrient levels in adjacent waters.

Mitigation Sites: 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 marsh restoration and nourishment. Because all mitigation sites are in areas heavily influenced by Gulf of Mexico tides, it is anticipated that nutrient releases occurring during construction would be quickly dispersed and diluted.

Structures: Because fill material associated with construction of structures is anticipated to be dewatered prior to placement, it would therefore be relatively free of ammonia commonly associated with sediment pore water. Therefore, placement of fill material during structure construction is not anticipated to significantly impact nutrient levels in adjacent waters.

(i) Eutrophication

(All Features)
As discussed in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix,* elevated nutrients and abundance of non-native aquatic plants (both indicators of potential eutrophication) are a commonly cited suspected cause of impairment for study area waterbodies. Citation of nutrients, total phosphorus, nitrate/nitrite, and non-native aquatic plants as a suspected cause of impairment occurred disproportionately on the protected side of the proposed levee alignment. The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in the distribution of eutrophic conditions within the study area.

With the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes to levels of eutrophication within the study area may be more significant. For example, more frequent closure of structures could lead to a greater level of influence of Atchafalaya River water north of the proposed levee alignment while preventing flushing of this same area with estuarine waters. Because the river water contains elevated nutrient (particularly nitrate) levels, nutrient concentrations in this area may increase directly, leading to an increase in the frequency and distribution of eutrophic conditions.

Levee Reaches: 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 water bodies. Associated impacts to the water column from placement of levee fill material would therefore be localized and temporary.

Mitigation Sites: 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 marsh restoration and nourishment. Because all mitigation sites are in areas heavily influenced by Gulf of Mexico tides, it is anticipated that nutrient releases occurring during construction would be quickly dispersed and diluted, thereby preventing localized algal blooms.

Structures: Because fill material associated with construction of structures is anticipated to be dewatered prior to placement, it would therefore be relatively free of ammonia commonly associated with sediment pore water. Therefore, placement of fill material during structure construction is not anticipated to significantly impact nutrient levels or potential for algal blooms in adjacent waters.

(j) Others as Appropriate

(2) Current Patterns and Circulation

(a) Current Patterns and Flow

(All Features)
Predicted project impacts of the project on flows within the Terrebonne estuary are available in the report the modeling report *Comparison of Plan Alternatives for the Morganza to the Gulf of Mexico Levee System.* Model results generally indicate very little change in water levels in the study area and discharge rates through transects along the proposed levee alignment under any of the structure operational plans modeled, indicating

the project would not induce significant changes on hydrology of the estuary under historical sea level rates.

The authorized alignment builds on existing hydrologic barriers, such as natural ridges, roadbeds, or existing levees that have been built for other purposes such as forced drainage or marsh management. Of the estimated 77 miles of levee originally proposed in the authorized alignment, approximately 16 miles would cross part of the estuaries that are currently open to estuarine exchange. The proposed project includes numerous environmental water control structures to allow hydrologic exchange through the levees. In addition, with the exception of the HNC Lock Complex, the navigation structures are planned to closely maintain the present hydrologic exchange characteristics of the waterways, except during tropical storm closure events. At times, the HNC Lock Complex will be operated to reduce salinity in the HNC. This operation would lower the present hydrologic exchange rate along the HNC.

Although it is anticipated that the proposed project will minimize impacts to water circulation, localized changes in water circulation may occur within the project area as a result of the addition of significant basin hydraulic features. In addition, with the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, significant changes in water circulation and hydrology within the study area could occur.

(b) Velocity

(All Features)
See II.b.2(a) (Current Patterns and Flow)

(c) Stratification.

(All Features)
The project is generally not expected to contribute to stratification in the water column. During extended durations of closure of the HNC Lock Complex for salinity control, salinity stratification in the HNC inland of the Lock Complex will be reduced due to the restriction of higher salinity water, which can contribute to stratification, from entering the HNC inland of the Lock Complex. However, since salinity will increase in the area south of the Complex during these times, the potential for salinity stratification in the HNC south of the Lock Complex will increase due to higher salinity and reduced circulation.

Extended durations of closure of the HNC Lock complex may also contribute to temperature and dissolved oxygen stratification, both upstream and downstream of the complex. This phenomena has been observed in the Mississippi River Gulf Outlet (MRGO) channel (a similar long and straight navigation channel connecting the Gulf of Mexico with inland areas) following the construction of the MRGO rock barrier.

Because bypass channels would be constructed prior to construction of cofferdams for navigable floodgates, and therefore impacts to water circulation for adjacent waters during construction would be minimized, no significant stratification is anticipated as a result of the implementation of cofferdams.

(d) Hydrologic Regime.

(All Features)
See II.b.2(a) (Current Patterns and Flow)

(3) Normal Water Level Fluctuations/Hydroperiod.

(All Features)
See II.b.2(a) Current Patterns and Flow

(4) Salinity Gradients.

(All Features)
See II.b.1.(a) (Salinity)

(5) Actions That Would Be Taken to Minimize Impacts.

(All Features)
A major component of the proposed project includes the construction of 21 environmental control structures along the proposed levee alignment. The purpose of the environmental control structures is to provide flood control during storm conditions and to match existing drainage patterns during non-storm conditions. Environmental control structures consist of box culverts and sluice gates allowing tidal exchange. The number of 6-ft by 6-ft or 5-ft by 10-ft culverts at each location varies from one to nine.

Levees: Material obtained from adjacent borrow areas for initial levee lifts would be dewatered prior to placement, and material will be placed between levee berms, minimizing water column impacts associated with levee construction.

Mitigation Sites: Use of confinement dikes would allow for clarification of effluent waters prior to discharge into receiving waterbodies, thereby reducing water column impacts associated with elevated turbidity levels such as low dissolved oxygen levels.

Structures: Construction of structures (i.e., floodgates, tidal exchange structures, and the locks) would result in localized increases in turbidity associated with runoff of construction materials. To minimize construction-related impacts, 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.

c. Suspended Particulate/Turbidity Determinations

(1) Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site

(All Features)
Levee Reaches: 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.

Mitigation Sites: Use of confinement dikes would allow for clarification of effluent waters prior to discharge into receiving waterbodies, and would minimize any suspended particulates and turbidity associated with effluent discharge.

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.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light penetration

(All Features)
See II.c.1 Expected Changes in Suspended Particulates and Turbidity Levels in Vicinity of Disposal Site.

(b) Dissolved oxygen

(All Features)
See section II.b.1(g) (Dissolved Gas Levels)

(c) Toxic metals and organics

See section II.d (Contaminant Determinations)

(d) Pathogens

(All Features)
The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in the distribution of waterbourne pathogens within the study area.

As discussed in the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix,* elevated fecal coliform densities is the second most commonly cited suspected cause of impairment for study area waterbodies. Citation of elevated fecal coliform densities as a suspected cause of impairment occurred disproportionately on the protected side of the proposed levee alignment. The proposed project primarily traverses existing hydraulic barriers within the Terrebonne estuary and includes a myriad of water control structures, minimizing impacts to water circulation as practicably as possible while still providing hurricane protection. However, localized changes in water circulation may occur within the project area. These localized changes in water circulation may induce localized changes in fecal coliform densities within the study area.

In addition, with the increase in sea-level rise, it is anticipated that the local sponsor may desire more frequent closure of environmental control structures to reduce damages from higher stages unrelated to storm events. If this change in operation were authorized, changes to pathogen concentrations within the study area may be more significant. For example, more frequent closure of structures could prevent flushing of waters containing pathogens with relatively clean Gulf of Mexico waters, resulting in stagnation of waters with elevated pathogen concentrations.

(3) Effects on Biota.

(a) Primary production, photosynthesis. Primary production in the project area is subject to normally turbid conditions due to the high-suspended sediment loads within the water column. During actual construction activities of project features there would be short-term direct impacts to phytoplankton populations due to increases in turbidity, low dissolved oxygen (DO), and introduction of dredged sediments into shallow open water areas. Submerged aquatic vegetation (SAV) would be buried at both the marsh creation sites and the levee sites. Photosynthesis rates in the area would drop due to the turbidity and the burial. Phytoplankton populations should return after construction. Photosynthesis rates would return once the turbidity clears and the newly created marsh will replace the loss due to the burial of the SAV.

(b) Suspension/filter feeders. Direct impact will be experienced by filter feeders at the dredging operation and at the disposal sites. Filter feeders will be removed from the dredging locations during dredging operations. Existing filter feeders will be buried at the disposal sites where wetlands and levees are to be created. With favorable conditions, filter feeders will quickly reestablish in the new environments. Filter feeders adjacent to the dredging and placement areas will be indirectly impacted by the increased turbidity. Filter feeders gills can be clogged and prevent feeding. In response the organism will stop feeding and as long as the event is short lived a high mortality rate is not expected.

(c) Sight feeders. Sight feeders in the project area include freshwater and saltwater fish species. Slight visibility decreases will be experienced in the immediate vicinity of the dredging operations. Conditions will return to pre-project levels upon completion of operations. Disposal sites will have material placement to create wetlands eliminating site feeding opportunities but increasing nursery grounds for such species. Levee sites will be removed completely from the use of the fish. A temporary avoidance of the work area will occur.

(4) Actions Taken To Minimize Impacts. Construction operations are expected to temporarily increase the concentration of suspended particulates. Particulates suspended during project construction would dissipate after construction activities are complete. Temporary increases in suspended particulates will be minimized as much as possible through best management practices such as creating containment berms, use of silt fencing, silt curtains, and seeding, to prevent the unnecessary transport of sediments within the construction and placement areas.

d. Contaminant Determinations.

(All Features)
Project-specific sediment, water, and elutriate chemistry data was collected. Water and sediment samples were collected from a total of twelve (12) sites between January 31st and February 2nd, 2011 (see **Table 3 and Figure 3**).

Table 3 – Project-specific water and sediment sampling sites

Station ID	Latitude	Longitude	Station Description	Sampling Date
Site 1	29.650000	-90.872500	Munson's World Famous Swamp Tours, north of Barrier Alignment	1/31/2011
Site 2	29.548056	-90.791111	Near canal with bridge crossing, 1/2 miles east of Minors Canal	1/31/2011
Site 3	29.417500	-90.784722	Canal by upper Bayou du Large pump station	1/31/2011
Site 4	29.335556	-90.843333	Floodgate near end of Bayou Dularge Road	2/1/2011
Site 5	29.389739	-90.733056	South of east end of Falgout Canal	2/1/2011
Site 6	29.384444	-90.729167	Houma Navigation Canal and Falgout Road	2/1/2011
Site 7	29.302222	-90.670000	Highway 57 northwest of Rabbit Bayou – location of proposed culvert with sluice gates	2/1/2011
Site 8	29.387500	-90.587778	Flood side of Mason Canal Road at proposed Bayou Terrebonne floodgate	2/1/2011
Site 9	29.437836	-90.565075	Near dock at Humble Canal, west of Humble Canal floodgate	2/1/2011
Site 10	29.430833	-90.587778	Pump station, Oak Point Road off of Highway 65	2/2/2011
Site 11	29.474122	-90.435028	Shoreline of Grand Bayou Canal at proposed Grand Bayou floodgate	2/2/2011
Site 12	29.543889	-90.402778	Off Highway 24 across from shipyard in GIWW, at proposed Grand Bayou floodgate	2/2/2011

The purpose of data collection was to ensure proposed dredged material disposal activities associated with adjacent borrow areas do not have adverse environmental effects on the receiving aquatic environment. Disposal of dredged material should not exceed State or Federal water quality criteria outside of the established mixing zone in order to comply with the section 404(b)(1) guidelines and in order to ensure 401 water quality certification. Evaluation of sediment chemistry was performed to determine whether sediment has the potential to result in mortality of mobile benthic organisms. Evaluation of water and elutriate chemistry is typically performed to determine whether the proposed discharge of dredged material effluent exceeds State and/or Federal water quality criteria outside of the State-enforced mixing zone, and therefore may result in toxicity to water column organisms. Sample preparation and testing is performed in accordance with the *Inland Testing Manual* and/or *Upland Testing Manual*, depending on the proposed dredged material disposal method.

Table 4 displays the chemical classes included in the analysis of sediment, water, and elutriates, the latter of which is a mixture of dredging site water and sediment at proportions intended to replicate those of hydraulic dredging. Up to five (5) herbicides, Fourteen (14) inorganic/general chemistry parameters, twenty one (21) metals, twenty four (24) pesticides, seven (7) PCB congeners, nine (9) PAHs, fifty eight (58) semi-volatile organic compounds, fifty four (54) volatile organic compounds, and total petroleum hydrocarbons were included in the analyses. As a disclaimer, analysis of elutriates for project-specific sampling and analysis does not suggest adjacent borrow would be hydraulically placed for levee construction; in contrast, material would be mechanically excavated and dewatered prior to placement. Therefore, elutriate test results have little bearing on predicted water column impacts during placement of adjacent borrow for levee fill. In addition, the type of elutriate test conducted (modified elutriate or standard elutriate) was not specified in the laboratory report. In summary, the purpose and type of elutriate testing conducted for this project was not specified, however results of testing is being provided herein.

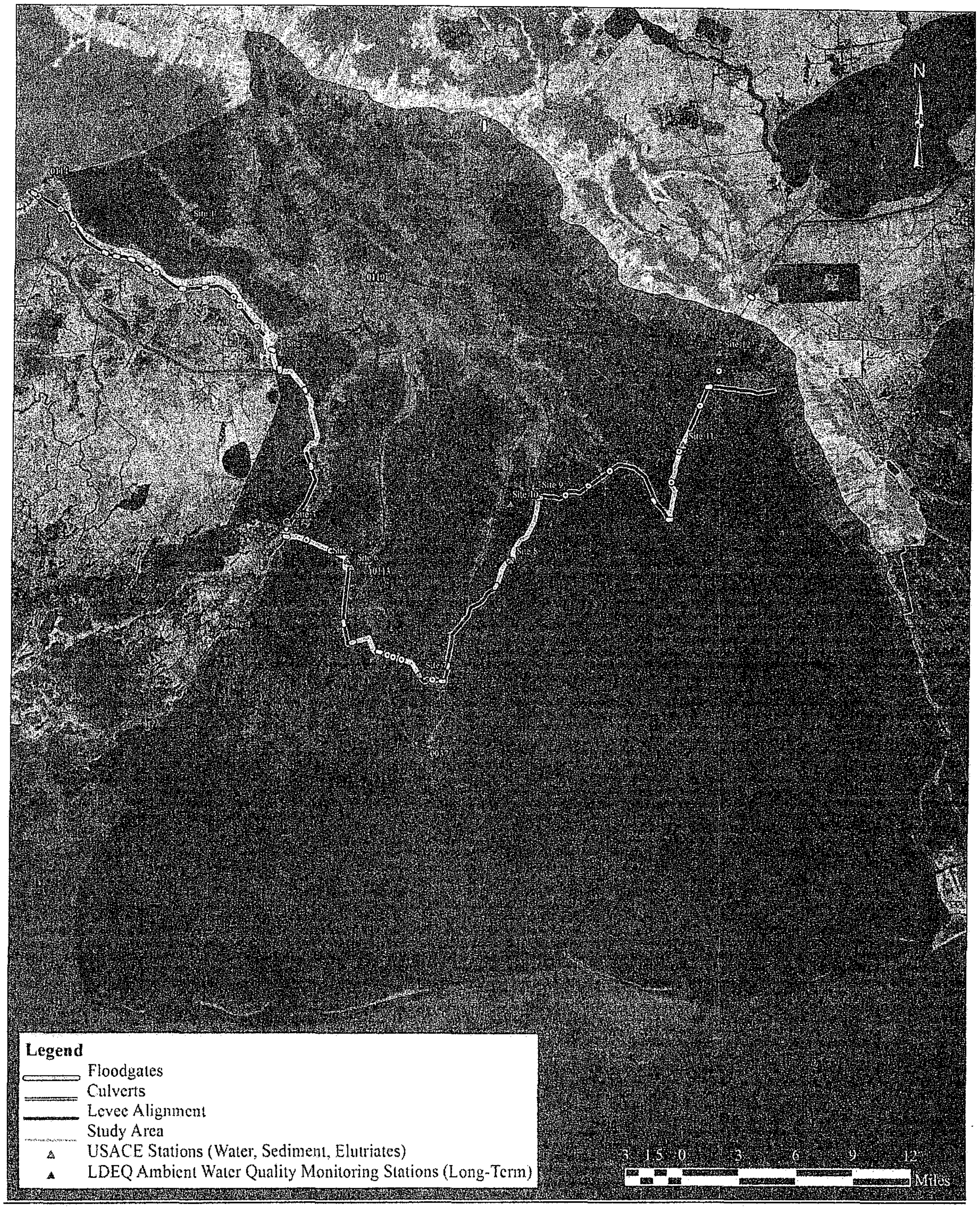


Figure 3 – Project-specific water and sediment sampling sites and LDEQ long-term monitoring stations

Table 4 – Chemical classes included in sediment, water, and elutriate analysis

Chemical Class	Sediment	Water	Elutriate
Herbicides	X	X	X
Inorganic/General Chemistry	X	X	X
Metals	X	X	X
Pesticides	X	X	X
Polychlorinated Biphenyls	X	X	X
Polycyclic Aromatic Hydrocarbons	X	X	X
Semi-Volatile Organic Compounds	X	X	X
Total Petroleum Hydrocarbons	X	X	X
Volatile Organic Compounds	X	X	

Water and Elutriate Quality

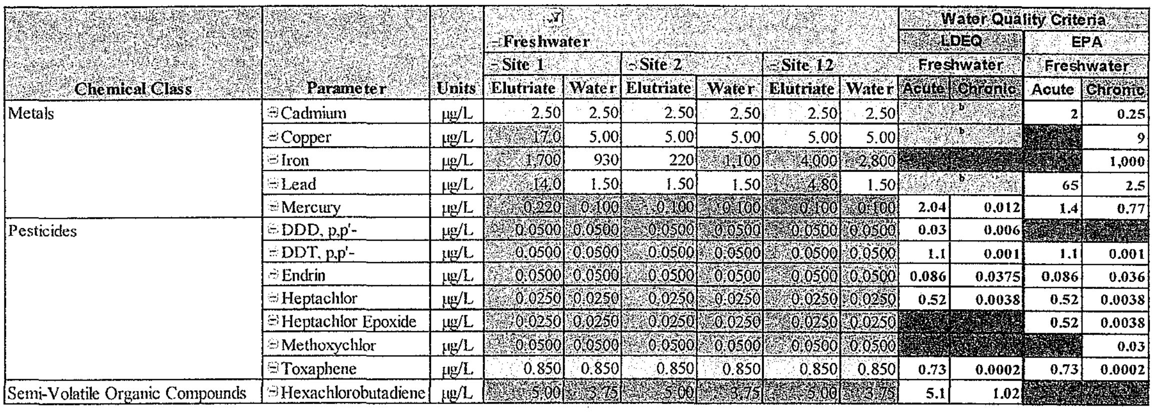
Water and elutriate chemistry data was compared with applicable State and Federal water quality criteria to determine whether results exceeded these criteria. Salinity data from LDEQ water quality monitoring stations in proximity to project-specific sampling sites was used to estimate the salinity regime of these sites, in order to determine applicable water quality criteria (LDEQ water quality criteria exists for freshwater, brackish, and marine waters, while EPA water quality criteria exists for freshwater and marine waters).

Tables 5 and **6** below display exceedances of water quality criteria for water and elutriates. In most cases, values exceeding criteria are not measured values, but are instead estimates, as results were below the laboratory reporting limit (in other words, the concentration was below that which the laboratory could quantify with confidence).

For freshwater sites (**Tables 5** and **6**), the only exceedances for measured values are for copper (Site 1 elutriate), iron (Site 1 elutriate, Site 2 water, Site 12 elutriate and water), lead (Site 1 elutriate, site 12 elutriate), and mercury (site 1 elutriate). These measured elutriate concentrations, which are for exceedances of chronic water quality criteria, are within one order of magnitude of criteria.

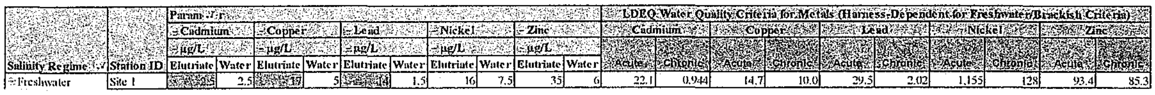
Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded acute criteria for cadmium, p,p'-DDD, and toxaphene, for all freshwater sites and both analytical media (water and elutriates), and chronic criteria for cadmium, mercury, p,p'-DDD, p,p'-DDT, endrin, heptachlor, heptachlor epoxide, methoxyclor, toxaphene, and hexachlorobutadiene for all freshwater sites and both analytical media.

Table 5 – Exceedances of water quality criteria for freshwater sites (excludes State hardness-dependent metals criteria)



			Freshwater						Water Quality Criteria			
									LDEQ		EPA	
			Site 1		Site 2		Site 12		Freshwater		Freshwater	
Chemical Class	Parameter	Units	Elutriate	Water	Elutriate	Water	Elutriate	Water	Acute	Chronic	Acute	Chronic
Metals	Cadmium	µg/L	2.50	2.50	2.50	2.50	2.50	2.50	b		2	0.25
	Copper	µg/L	17.0	5.00	5.00	5.00	5.00	5.00	b			9
	Iron	µg/L	1,700	930	220	1,100	4,000	2,800				1,000
	Lead	µg/L	14.0	1.50	1.50	1.50	4.80	1.50	b		65	2.5
	Mercury	µg/L	0.220	0.100	0.100	0.100	0.100	0.100	2.04	0.012	1.4	0.77
Pesticides	DDD, p,p'-	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.03	0.006		
	DDT, p,p'-	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	1.1	0.001	1.1	0.001
	Endrin	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.086	0.0375	0.086	0.036
	Heptachlor	µg/L	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.52	0.0038	0.52	0.0038
	Heptachlor Epoxide	µg/L	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250			0.52	0.0038
	Methoxychlor	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500				0.03
	Toxaphene	µg/L	0.850	0.850	0.850	0.850	0.850	0.850	0.73	0.0002	0.73	0.0002
Semi-Volatile Organic Compounds	Hexachlorobutadiene	µg/L	5.00	3.75	5.00	3.75	5.00	3.75	5.1	1.02		

Table 6– Exceedances of State hardness-dependent metals criteria

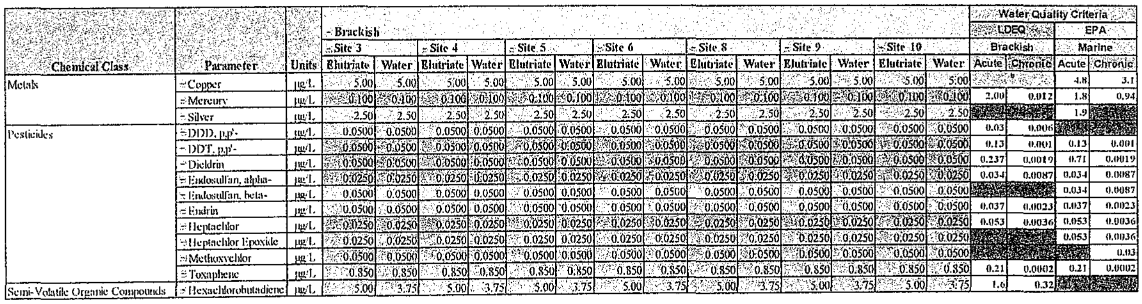


		Parameter										LDEQ Water Quality Criteria for Metals (Harness-Dependent for Freshwater/Brackish Criteria)									
		Cadmium		Copper		Lead		Nickel		Zinc		Cadmium		Copper		Lead		Nickel		Zinc	
		µg/L		µg/L		µg/L		µg/L		µg/L											
Salinity Regime	Station ID	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic	Acute	Chronic
Freshwater	Site 1	2.5	2.5	17	5	14	1.5	16	7.5	35	6	22.1	0.944	14.7	10.0	29.5	2.02	1,155	128	93.4	85.3

For brackish sites (**Table 7 and 8**), the only measured concentration exceeding criteria was for ammonia (Site 5, elutriate).

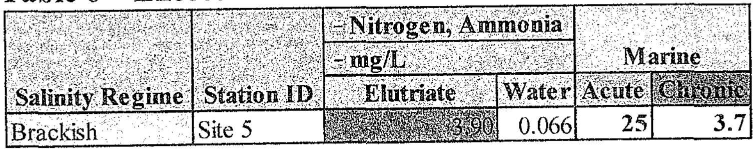
Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded acute criteria for copper, silver, p,p'-DDD, beta-endosulfan, endrin, toxaphene, and hexachlorobutadiene for all brackish sites and both analytical media, and chronic criteria for copper, mercury, silver, p,p'-DDD, p,p'-DDT, dieldrin, alpha-endosulfan, beta-endosulfan, endrin, heptachlor, heptachlor epoxide, methoxychlor, toxaphene, and hexachlorobutadiene for all brackish sites and both analytical media.

Table 7 – Exceedances of water quality criteria for brackish sites



			Brackish														Water Quality Criteria			
																	LDEQ		EPA	
			Site 3		Site 4		Site 5		Site 6		Site 8		Site 9		Site 10		Brackish		Marine	
Chemical Class	Parameter	Units	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Elutriate	Water	Acute	Chronic	Acute	Chronic
Metals	Copper	µg/L	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	b		4.8	3.1
	Mercury	µg/L	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	2.00	0.012	1.8	0.94
	Silver	µg/L	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50			1.9	
Pesticides	DDD, p,p'-	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.03	0.006		
	DDT, p,p'-	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.13	0.001	0.13	0.001
	Dieldrin	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.237	0.0019	0.71	0.0019
	Endosulfan, alpha-	µg/L	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.034	0.0087	0.034	0.0087
	Endosulfan, beta-	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500			0.034	0.0087
	Endrin	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.037	0.0023	0.037	0.0023
	Heptachlor	µg/L	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.053	0.0036	0.053	0.0036
	Heptachlor Epoxide	µg/L	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250	0.0250			0.053	0.0036
	Methoxychlor	µg/L	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500	0.0500				0.03
	Toxaphene	µg/L	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.850	0.21	0.0002	0.21	0.0002
Semi-Volatile Organic Compounds	Hexachlorobutadiene	µg/L	5.00	3.75	5.00	3.75	5.00	3.75	5.00	3.75	5.00	3.75	5.00	3.75	5.00	3.75	1.6	0.32		

Table 8 – Exceedances of Federal criteria for ammonia



		Nitrogen, Ammonia			
		mg/L		Marine	
Salinity Regime	Station ID	Elutriate	Water	Acute	Chronic
Brackish	Site 5	3.90	0.066	25	3.7

For marine sites (**Table 9**), no exceedances of measured values were reported.

Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded acute criteria for silver, beta-endosulfan, endrin, toxaphene, and hexachlorobutadiene for all marine sites and both media, and chronic criteria for mercury, silver, p,p'-DDT, dieldrin, alpha-endosulfan, beta-endosulfan, endrin, heptachlor, heptachlor epoxide, methoxychlor, toxaphene, and hexachlorobutadiene for all marine sites and both media.

9 – Exceedances of water quality criteria for marine sites

							Water Quality Criteria			
			Marine				LDEQ		EPA	
			Site 7		Site 11		Marine		Marine	
Chemical Class	Parameter	Units	Elutriate	Water	Elutriate	Water	Acute	Chronic	Acute	Chronic
Metals	Mercury	µg/L	0.100	0.260	0.100	0.100	2	0.025	1.8	0.94
	Silver	µg/L	2.50	2.50	2.50	2.50			1.9	
Pesticides	DDT, p,p'-	µg/L	0.0500	0.0500	0.0500	0.0500	0.13	0.001	0.13	0.001
	Dieldrin	µg/L	0.0500	0.0500	0.0500	0.0500	0.71	0.0019	0.71	0.0019
	Endosulfan, alpha-	µg/L	0.0250	0.0250	0.0250	0.0250	0.034	0.0087	0.034	0.0087
	Endosulfan, beta-	µg/L	0.0500	0.0500	0.0500	0.0500			0.034	0.0087
	Endrin	µg/L	0.0500	0.0500	0.0500	0.0500	0.037	0.0023	0.037	0.0023
	Heptachlor	µg/L	0.0250	0.0250	0.0250	0.0250	0.053	0.0036	0.053	0.0036
	Heptachlor Epoxide	µg/L	0.0250	0.0250	0.0250	0.0250			0.053	0.0036
	Methoxychlor	µg/L	0.0500	0.0500	0.0500	0.0500				0.03
	Toxaphene	µg/L	0.850	0.850	0.850	0.850	0.21	0.0002	0.21	0.0002
Semi-Volatile Organic Compounds	Hexachlorobutadiene	µg/L	5.00	3.75	5.00	3.75	1.6	0.32		

Sediment Quality

Tables 10 - 11 below display exceedances of NOAA sediment screening values. In most cases, values exceeding screening values are not measured values, but are instead estimates, as results were below the laboratory reporting limit.

For freshwater sites (**Table 10**), the measured concentrations for arsenic, copper, nickel, and zinc exceeded freshwater Lowest Effect Level (LEL) screening values at all freshwater sites, while the measured value for mercury at Site 12 exceeded the freshwater LEL screening value.

Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded sediment screening values at all freshwater sites for the following parameters: antimony, mercury, silver, aldrin, gamma-BHC, p,p'-DDD, p,p'-DDE, p,p'-DDT, dieldrin, endrin, heptachlor epoxide, toxaphene acenaphthene, acenaphthalene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, phenanthrene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, and naphthalene.

Table 10 – Exceedances of sediment screening values for freshwater sites

			Freshwater			NOAA Sediment Screening Values for Freshwater Sediment *Predicted Toxicity Gradient: ——— Increasing ———→*							
Chemical Class	**Parameter**	**Units**	**Site 1**	**Site 2**	**Site 12**	**ARCS Hyalella TEL**	**TEL**	**TEC**	**LEL**	**PEL**	**PEC**	**SEL**	**UET**
Metals	Antimony	µg/kg	1,950	2,800	4,850								3,000 M
	Arsenic	µg/kg	6,600	4,400	6,400	10,798	5,900	9,790	6,000	17,000	33,000	33,000	17,000 I
	Copper	µg/kg	21,100	16,300	31,700	28,012	35,700	31,600	16,000	197,000	149,000	110,000	86,000 I
	Mercury	µg/kg	55.0	75.0	255		174	180	200	486	1,060	2,000	560 M
	Nickel	µg/kg	19,600	16,000	25,600	19,514	18,000	22,700	16,000	36,000	48,600	75,000	43,000 H
	Silver	µg/kg	325	465	800				500				4,500 H
	Zinc	µg/kg	81,500	61,100	152,000	98,000	123,000	121,000	120,000	315,000	459,000	820,000	520,000 M
Pesticides	Aldrin	µg/kg	1.15	1.60	2.75				2.00			80.0	40.0 I
	BHC, gamma-	µg/kg	1.15	1.60	2.75		0.940	2.37	3.00	1.38	4.99	10.0	9.00 I
	DDD, p,p'-	µg/kg	2.25	3.10	5.35		3.54	4.88	8.00	8.51	28.0	60.0	60.0 I
	DDE, p,p'-	µg/kg	2.25	3.10	5.35		1.42	3.16	5.00	6.75	31.3	190	50.0 I
	DDT, p,p'-	µg/kg	2.25	3.10	5.35		1.19 c	4.16	8.00	4.77 c	62.9	710	50.0 I
	Dieldrin	µg/kg	2.25	3.10	5.35		2.85	1.90	2.00	6.67	61.8	910	300 I
	Endrin	µg/kg	2.25	3.10	5.35		2.67	2.22	3.00	62.4	207	1,300	500 I
	Heptachlor Epoxide	µg/kg	1.15	1.60	2.75		0.600	2.47	5.00	2.74	16.0	50.0	30.0 I
	Toxaphene	µg/kg	22.4	31.2	53.5		0.100 c						
Polycyclic Aromatic Hydrocarbons	Acenaphthene	µg/kg	224	312	535		6.71 c			88.9 c			290 M
	Acenaphthylene	µg/kg	224	312	535		5.87 c			128 c			
	Anthracene	µg/kg	224	312	535	10.0	46.9 c	57.2	220	245 c	845	3,700	260 M
	Benzo(a)anthracene	µg/kg	224	312	535	15.7	31.7	108	320	385	1,050	14,800	500 I
	Benzo(a)pyrene	µg/kg	224	312	535	32.4	31.9	150	370	782	1,450	14,400	700 I
	Benzo(g,h,i)perylene	µg/kg	224	312	535				170			3,200	300 M
	Benzo(k)fluoranthene	µg/kg	224	312	535	27.2			240			13,400	13,400 B
	Phenanthrene	µg/kg	224	312	535	18.7	41.9	204	560	515	1,170	9,500	800 I
Semi-Volatile Organic Compounds	Chrysene	µg/kg	224	312	535	26.8	57.1	166	340	862	1,290	4,600	800 I
	Dibenzo(a,h)anthracene	µg/kg	224	312	535	10.0	6.22 c	33.0	60.0	135 c		1,300	100 M
	Fluoranthene	µg/kg	224	312	535	31.5	111	423	750	2,355	2,230	10,200	1,500 M
	Fluorene	µg/kg	224	312	535	10.0	21.2 c	77.4	190	144 c	536	1,600	300 M
	Naphthalene	µg/kg	113	157	271	14.7	34.6 c	176		391 c	561		600 I

For brackish sites (**Table 11**), sediment screening values were exceeded for measured or estimated (j-flagged, not below the laboratory reporting limit) concentrations of aluminum (AET at all sites), antimony (T_{20} at sites 8, 9, and 10; T_{50} at sites 3, 4, and 5), arsenic (ERL at Site 9), barium (TEL at sites 3, 4, 5, 6, 9, and 10), cobalt (AET at Site 9), copper (TEL at sites 3, 4, and 5; ERL at Site 6), manganese (AET at sites 3, 4, 6, 8, 9, and 10), nickel (TEL at sites 3, 4, 8, and 10; ERL at sites 5, 6, and 9), zinc (T_{20} at sites 4, 5, and 6; TEL at Site 3), benzo(a)anthracene (ERL at Site 3), benzo(a)pyrene (T_{50} at Site 3), benzo(b)fluoranthene (T_{20} at sites 4 and 8; T_{50} at Site 3), benzo(g,h,i)perylene (T_{20} at Site 3), phenanthrene (PEL at Site 5), chrysene (ERL at Site 3), fluoranthene (TEL at sites 3 and 6), pyrene (ERL at Site 3; TEL at Site 6), and Indeno(1,2,3-cd)pyrene (T_{20} at Site 3). With the exception of the measured phenanthrene concentration for Site 5, no measured values exceeded PEL or ERM screening values.

Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded sediment screening values at all brackish sites for the following parameters: mercury, silver, gamma-BHC, p,p'-DDD, p,p'-DDE, p,p'-DDT, dieldrin, heptachlor, heptachlor epoxide, toxaphene, acenaphthene, acenaphthylene, anthracene, benzo(k)fluoranthene, benzoic acid, benzyl alcohol, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, o-cresol, p-cresol, dibenzo(a,h)anthracene, dibenzofuran, 2,4-dimethylphenol, fluorine, hexachlorobenzene, 2-methylnaphthalene, naphthalene, nitrobenzene, and n-nitrosodiphenylamine. For benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, phenanthrene, chrysene, fluoranthene, pyrene, and indeno(1,2,3-cd)pyrene, estimated concentrations for sites with results below the laboratory reporting limit also exceeded sediment screening values.

Table 11 – Exceedances of sediment screening values for brackish sites

Chemical Class	Parameter	Units	Brackish							NOAA Sediment Screening Values for Marine Sediment *Predicted Toxicity Gradient: ——— Increasing ———→*							
			Site 3	Site 4	Site 5	Site 6	Site 8	Site 9	Site 10	T20	TEL	ERL	T50	PEL	ERM	AET	Eco Tox Eq
Metals	Aluminum	µg/kg	11,400,000	12,100,000	16,200,000	12,800,000	6,580,000	12,200,000	9,020,000							0.0180 N	
	Antimony	µg/kg	2,850	3,200	5,250	2,600	1,800	1,900	1,900	630			2,400			9,300 E	
	Arsenic	µg/kg	5,500	3,300	4,500	6,800	4,000	16,200	6,100	7,400	7,240	8,200	20,000	41,600	70,000	35,000 B	
	Barium	µg/kg	513,000	781,000	212,000	375,000	106,000	359,000	322,000		130,100 #						
	Cobalt	µg/kg	8,300	5,400	8,900	9,000	6,500	23,600	6,700							10,000 N	
	Copper	µg/kg	22,400	21,400	25,600	38,700	10,300	16,600	16,100	32,000	18,700	34,000	94,000	108,000	270,000	390,000 MO	
	Manganese	µg/kg	395,000	383,000	253,000	678,000	319,000	1,100,000	349,000							260,000 N	
	Mercury	µg/kg	85.0	90.0	140	75.0	55.0	60.0	55.0	140	130	150	480	700	710	410 M	
	Nickel	µg/kg	17,600	17,100	23,100	21,900	15,900	25,000	19,200	15,000	15,900	20,900	47,000	42,800	51,600	110,000 EL	
	Silver	µg/kg	475	550	800	950	300	320	315	230	730	1,000	1,100	1,770	3,700	3,100 B	
	Zinc	µg/kg	128,000	108,000	121,000	173,000	70,300	71,400	76,600	94,000	124,000	150,000	245,000	271,000	410,000	410,000 I	
Pesticides	BHC, gamma-	µg/kg	1.80	1.95	2.95	1.60	1.15	1.25	1.20		0.320			0.990		4.80 N	3.70
	DDD, p,p'-	µg/kg	3.55	3.80	5.75	3.05	2.25	2.40	2.30		1.22	2.00		7.81	20.0	16.0 I	
	DDE, p,p'-	µg/kg	3.55	3.80	5.75	3.05	2.25	2.40	2.30		2.07	2.20		374	27.0	9.00 I	
	DDT, p,p'-	µg/kg	3.55	3.80	5.75	3.05	2.25	2.40	2.30		1.19	1.00		4.77	7.00	12.0 E	
	Dieldrin	µg/kg	3.55	3.80	5.75	3.05	2.25	2.40	2.30	0.830	0.720	0.0200	2.90	4.30	8.00	1.90 E	
	Heptachlor	µg/kg	1.80	1.95	2.95	1.60	1.15	1.25	1.20							0.300 B	
	Heptachlor Epoxide	µg/kg	1.80	1.95	2.95	1.60	1.15	1.25	1.20	0.600 c				2.74 c			
	Toxaphene	µg/kg	35.3	38.0	57.5	30.6	22.5	24.1	22.9		0.100 c						28.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene	µg/kg	353	380	575	306	225	241	229	19.0	6.71	16.0	116	88.9	500	130 E	
	Acenaphthylene	µg/kg	353	380	575	306	225	241	229	14.0	5.87	44.0	140	128	640	71.0 E	
	Anthracene	µg/kg	353	380	575	306	225	241	229	34.0	46.9	85.3	290	245	1,100	280 E	
	Benzo(a)anthracene	µg/kg	288	380	575	306	225	241	229	61.0	74.8	261	466	693	1,600	960 E	
	Benzo(a)pyrene	µg/kg	637	380	575	306	225	241	229	69.0	88.8	430	520	763	1,600	1,100 E	
	Benzo(b)fluoranthene	µg/kg	1,130	182	575	306	185	241	229	130			1,107			1,800 EI	
	Benzo(g,h,i)perylene	µg/kg	292	380	575	306	225	241	229	67.0			497			670 M	
	Benzo(k)fluoranthene	µg/kg	466	380	575	306	225	241	229	70.0			537			1,800 EI	
	Phenanthrene	µg/kg	342	380	575	306	225	241	229	68.0	86.7	240	455	544	1,500	660 E	
Semi-Volatile Organic Compounds	Benzoic Acid	µg/kg	353	380	575	306	225	241	229							65.0 O	
	Benzyl Alcohol	µg/kg	353	380	575	306	225	241	229							52.0 B	
	Bis(2-Ethylhexyl) Phthalate	µg/kg	353	380	575	306	225	241	229		182			2,647		1,300 I	
	Butyl Benzyl Phthalate	µg/kg	353	380	575	306	225	241	229							63.0 M	1,100
	Chrysene	µg/kg	476	380	575	306	225	241	229	82.0	108	384	650	846	2,800	950 E	
	Cresol, o-	µg/kg	353	380	575	306	225	241	229							8.00 B	
	Cresol, p-	µg/kg	353	380	575	306	225	241	229							100 B	
	Dibenzo(a,h)anthracene	µg/kg	353	380	575	306	225	241	229	19.0	6.22	63.4	113	135	260	230 OM	
	Dibenzofuran	µg/kg	353	380	575	306	225	241	229							110 E	2,000
	Dimethylphenol, 2,4-	µg/kg	353	380	575	306	225	241	229							18.0 N	
	Fluoranthene	µg/kg	591	380	575	124	225	241	229	119	113	600	1,034	1,494	5,100	1,300 E	
	Fluorene	µg/kg	353	380	575	306	225	241	229	19.0	21.2	19.0	114	144	540	120 E	540
	Hexachlorobenzene	µg/kg	353	380	575	306	225	241	229							6.00 B	
	Methylnaphthalene, 2-	µg/kg	353	380	575	306	225	241	229	21.0	20.2	70.0	128	201	670	64.0 E	
	Naphthalene	µg/kg	179	193	292	155	101	122	116	30.0	34.6	160	217	391	2,100	230 E	480
	Nitrobenzene	µg/kg	353	380	575	306	225	241	229							21.0 N	
	N-Nitrosodiphenylamine	µg/kg	353	380	575	306	225	241	229							28.0 I	
	Pyrene	µg/kg	796	380	575	198	225	241	229	125	153	665	932	1,398	2,600	2,400 E	
	Pyrene, Indeno (1,2,3-cd)	µg/kg	345	380	575	306	225	241	229	68.0			488			600 M	

For marine sites (**Table 12**), sediment screening values were exceeded for measured concentrations of aluminum (T_{20} at Site 11; T_{50} at Site 7), arsenic (ERL at Site 11), barium (TEL at Site 11), cobalt (AET at Site 11), copper (TEL at both sites), manganese (AET at both sites), and nickel (ERL at both sites), and for the estimated (j-flagged, not below the laboratory reporting limit) concentration of butyl benzyl phthalate at Site 7. No measured values exceeded PEL or ERM screening values.

Results below the laboratory reporting limit, when estimated as one-half of the laboratory reporting limit, exceeded sediment screening values at both marine sites for the following parameters: silver, gamma-BHC, p,p'-DDD, p,p'-DDE, p,p'-DDT, dieldrin, heptachlor, heptachlor epoxide, toxaphene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, phenanthrene, benzoic acid, benzyl alcohol, bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, o-cresol, p-cresol, dibenzo(a,h)anthracene, dibenzofuran, 2,4-dimethylphenol, fluoranthene, fluorene, hexachlorobenzene, 2-methylnaphthalene, naphthalene, nitrobenzene, n-nitrosodiphenylamine, pyrene, and indeno(1,2,3-cd)pyrene. The concentration for butyl benzyl phthalate at Site 11, when estimated as one-half of the laboratory reporting limit, also exceeded the AET screening value.

Table 12 – Exceedances of sediment screening values for marine sites

			Marine		NOAA Sediment Screening Values for Marine Sediment *Predicted Toxicity Gradient:* → *Increasing* →							
Chemical Class	Parameter	Units	Site 7	Site 11	T20	TEL	ERL	T50	PEL	ERM	AET	Eco Tox EqP
Metals	Aluminum	µg/kg	8,770,000	14,100,000							0.0180 N	
	Antimony	µg/kg	4,100	2,900	630			2,400			9,300 E	
	Arsenic	µg/kg	4,500	10,300	7,400	7,240	8,200	20,000	41,600	70,000	35,000 B	
	Barium	µg/kg	95,500	201,000		130,100 #						
	Cobalt	µg/kg	7,200	10,900							10,000 N	
	Copper	µg/kg	20,600	22,200	32,000	18,700	34,000	94,000	108,000	270,000	390,000 MO	
	Manganese	µg/kg	307,000	630,000							260,000 N	
	Nickel	µg/kg	35,200	26,400	15,000	15,900	20,900	47,000	42,800	51,600	110,000 EL	
	Silver	µg/kg	700	365	230	730	1,000	1,100	1,770	3,700	3,100 B	
Pesticides	BHC, gamma-	µg/kg	2.30	1.25		0.320			0.990		4.80 N	3.70
	DDD, p,p'-	µg/kg	4.50	2.40		1.22	2.00		7.81	20.0	16.0 I	
	DDE, p,p'-	µg/kg	4.50	2.40		2.07	2.20		374	27.0	9.00 I	
	DDT, p,p'-	µg/kg	4.50	2.40		1.19	1.00		4.77	7.00	12.0 E	
	Dieldrin	µg/kg	4.50	2.40	0.830	0.720	0.0200	2.90	4.30	8.00	1.90 E	
	Heptachlor	µg/kg	2.30	1.25							0.300 B	
	Heptachlor Epoxide	µg/kg	2.30	1.25	0.600 c				2.74 c			
	Toxaphene	µg/kg	45.1	241		0.100 c						28.0
Polycyclic Aromatic Hydrocarbons	Acenaphthene	µg/kg	451	241	19.0	6.71	16.0	116	88.9	500	130 E	
	Acenaphthylene	µg/kg	451	241	14.0	5.87	44.0	140	128	640	71.0 E	
	Anthracene	µg/kg	451	241	34.0	46.9	85.3	290	245	1,100	280 E	
	Benzo(a)anthracene	µg/kg	451	241	61.0	74.8	261	466	693	1,600	960 E	
	Benzo(a)pyrene	µg/kg	451	241	69.0	88.8	430	520	763	1,600	1,100 E	
	Benzo(b)fluoranthene	µg/kg	451	241	130			1,107			1,800 EI	
	Benzo(g,h,i)perylene	µg/kg	451	241	67.0			497			670 M	
	Benzo(k)fluoranthene	µg/kg	451	241	70.0			537			1,800 EI	
	Phenanthrene	µg/kg	451	241	68.0	86.7	240	455	544	1,500	660 E	
Semi-Volatile Organic Compounds	Benzoic Acid	µg/kg	451	241							65.0 O	
	Benzyl Alcohol	µg/kg	451	241							52.0 B	
	Bis(2-Ethylhexyl) Phthalate	µg/kg	382	144		182			2,647		1,300 I	
	Butyl Benzyl Phthalate	µg/kg	551	241							63.0 M	1,100
	Chrysene	µg/kg	451	241	82.0	108	384	650	846	2,800	950 E	
	Cresol, o-	µg/kg	451	241							8.00 B	
	Cresol, p-	µg/kg	451	241							100 B	
	Dibenzo(a,h)anthracene	µg/kg	451	241	19.0	6.22	63.4	113	135	260	230 OM	
	Dibenzofuran	µg/kg	451	241							110 E	2,000
	Dimethylphenol, 2,4-	µg/kg	451	241							18.0 N	
	Fluoranthene	µg/kg	451	241	119	113	600	1,034	1,494	5,100	1,300 E	
	Fluorene	µg/kg	451	241	19.0	21.2	19.0	114	144	540	120 E	540
	Hexachlorobenzene	µg/kg	451	241							6.00 B	
	Methylnaphthalene, 2-	µg/kg	451	241	21.0	20.2	70.0	128	201	670	64.0 E	
	Naphthalene	µg/kg	228	122	30.0	34.6	160	217	391	2,100	230 E	480
	Nitrobenzene	µg/kg	451	241							21.0 N	
	N-Nitrosodiphenylamine	µg/kg	451	241							28.0 I	
	Pyrene	µg/kg	451	241	125	153	665	932	1,398	2,600	2,400 E	
	Pyrene, Indeno (1,2,3-cd)	µg/kg	451	241	68.0			488			600 M	

With the exception of sediment phenanthrene measurements at Site 5, all other measured concentrations exceeding sediment screening values for those indicative of low-level contamination. In addition, adjacent borrow material is expected to have characteristics similar to sediments present at the proposed placement sites. Therefore, no significant changes in sediment quality at the placement sites are anticipated.

The proposed hurricane protection project could have significant indirect impacts on contaminant levels in the study area, the extent to which is largely unknown. Based on historical water quality information for the study area, it is clear that a majority of the water quality problems within the study area occur on the protected side of the proposed levee alignment (see the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix* for details). Although the modeling report *Comparison of Plan Alternatives for the Morganza to the Gulf of Mexico Levee System* suggests that proper management of gates and tidal exchange structures can minimize changes in flow and water level between the flood and protected side of the proposed levee alignment, it is a legitimate concern that the proposed alignment will cause significant alteration of hydrology and hydraulics in the study area, such that water exchange between the protected and flood sides of the proposed levee alignment is significantly inhibited, and that localized areas of stagnation behind the levee alignment may occur. If these conditions present themselves, the levee alignment would serve as a barrier between relatively free of contamination Gulf of Mexico waters and impaired waters, further exacerbating water quality conditions on the protected side of the alignment while maintaining or improving the health of waters on the flood side. Moreover, the potential expansion of developed areas as a result of the project could lead to additional point and nonpoint discharges within the hurricane protection system, which would further degrade water quality on the protected side of the propose alignment. Also, as sea-level rise increases water levels in the study area, the frequency with which environmental water control structures are closed could increase provided it is authorized, causing further stagnation for waters on the protected side of the proposed levee alignment.

Hydrology plays a major role in biogeochemical cycling in wetlands (Mitsch and Gosselink 2000); therefore, 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 hurricane protection system.

A major potential benefit of the project is that it would provide for the protection of marshes on the flood side of the proposed levee alignment, potentially extending the lifespan of these marshes. However, the marshes just outside of the hurricane protection system are expected to be subjected to an increase in wave energy as a result of the proposed project, which could lead to the accelerated loss of unprotected marsh vegetation. This detracts from rationale for utilizing the topmost organic sediment layer of adjacent levee borrow areas for marsh construction on the flood side of the proposed levee alignment. Similar to on the protected side of the proposed levee alignment, wetland loss on the flood side could negatively affect water quality via the decrease in area of wetlands vegetation capable of filtering pollutants and nutrients, increases in suspended solids and turbidity, and releases of constituents stored by deteriorating wetlands vegetation.

e. Aquatic Ecosystem and Organism Determinations

(1) Effects on Plankton. Section 6.4.2 of the RPDEIS goes into details on the impacts to this resource. During actual construction activities of project features there would only be short-term minor adverse impacts to plankton populations due to increases in turbidity, low DO, and introduction of dredged sediments into shallow open water areas. There would be long-term loss of shallow water habitats due to dredge disposal activities. However, there is an abundance of shallow open water habitat available for use by plankton.

(2) Effects on Benthos. Section 6.4.1 of the RPDEIS goes into details on the impacts to benthic resources. Direct effects on benthic habitat include covering and smothering of benthic organisms in association with levee construction and similar activities in wetlands and aquatic habitats. Borrow material removed from

aquatic and wetland habitats would result in a temporary loss of the benthic organisms followed by re-colonization from adjacent areas, however, because of a change in depth and other habitat characteristics, the structure of the benthic community may be altered.

(3) Effects on Nekton. Nekton are largely comprised of animals from three clades; vertebrates, mollusks, and crustaceans. Direct impacts to nekton from implementation of the proposed action would result from construction of project features. Impacts from construction of water control structures may include direct mortality due to burial or sudden salinity changes; injury or mortality due to increased turbidity (e.g. gill abrasion, clogging of feeding apparatus); modified behavior, and short-term displacement. Dredging and placement of borrow material associated with dredge features, levee construction, and marsh creation would negatively impact benthic organisms and benthic feeders in dredge channels and disposal areas. Sessile and slow-moving aquatic invertebrates would be disturbed by the dredge or excavation activity or buried by the placed material. Construction activities would temporarily increase turbidity, temperatures, and biological oxygen demand (BOD), and decrease dissolved oxygen. These temporary conditions would likely displace more mobile nekton from the construction area. Following construction, displaced nekton would likely return to the project area.

(4) Effects on the Aquatic Food Web. *Mitigation Sites:* The aquatic food web at the mitigation sites are expected to be affected for a period of a few months after the deposition of dredged material. Populations of organisms at all levels of the food web would be decreased or eliminated in the vicinity of the disposal site from a combination of effects including turbidity, decreased DO, physical burying and displacement. The decrease in light penetration from increased turbidity would cause a decline of phytoplankton populations. This decline in primary productivity would also reduce zooplankton populations and populations of filter feeders and other high order predators. A viable food web is expected to reestablish after the completion of disposal activities and consolidation of sediments.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Refuges. Coordination has occurred and would continue with US Fish and Wildlife Service and Louisiana Department of Fish and Wildlife concerning construction in the Mandalay National Wildlife Refuge and Pointe Aux Chenes Wildlife Management Area.

(b) Wetlands. Section 6.2.2 of the RPDEIS goes into details on the impacts to wetlands. The constructible components of the 1% AEP Alternative would result in the filling of wetlands and their conversion to uplands and open water. The table below summaries the acres affected by the projects' constructible features. These impacts will be mitigated for as part of the proposed action.

Acres of Wetlands Directly Effected			
Features	**Tidal Wetlands**	**Force Drained Wetlands**	**Total wetlands**
Constructible Features	644.35	25.98	670.33
Programmatic Features	4,047	57	4,104

Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh and open water are within the indirect impacts area for the constructible features (Figure 2). Approximately 84 miles of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers.

To mitigate for the indirect impacts approximately 1,765 acres of marsh will be created from dredged material. Most of this material will come from the construction of the lock complex and the by-pass channel. A total of approximately 2,690 acres of wetland will be created for both the direct and indirect impacts. Most of this material will come from the organic overburden in the adjacent borrow pits to the levee reaches and from the area of the construction of the lock complex and the by-pass channel.

(c) Mud Flats. Section 6.6.2 of the RPDEIS goes into details on the impacts to Essential Fish Habitat (EFH). Mud Flats are one the EFH in the project area.

(d) Vegetated Shallows. Section 6.6.2 of the RPDEIS goes into details on the impacts to EFH. Vegetated shallows are one the EFH in the project area. Construction activities using earthen materials to create wetland mitigation areas along the proposed right of way could bury EFH substrates or temporarily change environmental conditions, including turbidity and salinity, in the water column. These impacts would be minimized, as much as practicable, through implementation of appropriate Best Management Practices. The project would increase SAV and adjacent intertidal marsh vegetation (marsh creation areas) in some areas and decrease vegetation in other areas (levee construction areas).

(e) Coral Reefs. Not Applicable

(f) Riffle and Pool Complexes. Not Applicable

(6) Threatened and Endangered Species. Section 6.8.2 of the RPDEIS goes into details on the impacts to this resource. No direct impacts on threatened or endangered species would result from implementation of the 1% AEP Alternative.

(7) Other Wildlife. Section 6.7.2 of the RPDEIS goes into details on the impacts to this resource. Wildlife species using the marsh and open water habitat in the proposed right of way could easily avoid disturbances associated with construction activities. Birds would have ample alternative locations available for use. Mammals or reptiles that may inhabit the proposed construction areas would likely react to disturbances by relocating to adjacent marsh or open water habitats. Once the levee is constructed, it would provide additional upland habitat that may be valuable to some terrestrial wildlife species, such as snakes, lizards, terrapins, and rodents.

(8) Actions to Minimize Impacts. Formulation of project plans and designs, evaluation of alternative plans, and development of operational scenarios for the preferred alternative, have all been conducted with the objective of minimizing potential negative impacts to the aquatic ecosystem.

- Follow the National Bald Eagle Management Guidelines.
- During investigations for programmatic features look for ways to reduce levee foot print.
- Use best management practices to reduce runoff and turbidity during construction.

f. Proposed Disposal Site Determinations

(1) Mixing Zone Determination.

(All Features)
Because of the nature of sediment excavation and placement (dredged material will be excavated with a bucket dredge, allowed to dewater, and then placed for levee construction), very little dredged material effluent will be generated. In addition, elutriate tests conducted (which would be extremely conservative estimates of dissolved contaminant concentrations present in effluent generated during mechanical disposal or dewatered sediments) do not indicate the proposed disposal activity will have significant water column impacts (the highest exceedance observed is within one order of magnitude of chronic water quality criteria, while the only observed exceedance of acute criteria, for copper in the Site 1 elutriate sample, would be readily diluted by site water, having a dilution factor of -0.767). Therefore, there does not appear to be a reason to believe that disposal of mechanically dredged, dewatered dredged material will exceed water quality criteria outside of the proposed mixing zone.

(2) Determination of Compliance with Applicable Water Quality Standards.

(All Features)
There does not appear to be a reason to believe that disposal of mechanically

dredged, dewatered dredged material 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 the *Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix*, there is a long-term potential for indirectly affecting subsegment support, especially for subsegments on the protected side of the proposed levee alignment.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and private water supply.

(All Features)
The project would have a beneficial effect on water supplies. The multipurpose HNC Lock Complex would be constructed and operated as part of the Project to control storm surge and saltwater intrusion. The HNC Lock Complex would be operated to reduce salinity intrusion in the Houma Navigation Canal, thus reducing the raw source water salinity for the Houma Water Treatment Plant.

(b) Recreational and commercial fisheries. Recreational and commercial activities in the project area are based on vessel activity. There would be a minimum impact by the dredging and disposal activities. U.S. Coast Guard regulations, such as marine safety zones would be strictly adhered to for assurance of safe vessel passage. The area would return to pre-project conditions upon construction completion. Disposal areas would become a new feature of the landscape.

(c) Water-related recreation. Water related recreation would experience a minimum inconvenience at the time of dredging and disposal operations, but would return to pre-project conditions after project completion.

(d) Aesthetics. The aesthetics of the project area at the time of construction would be characterized by the presence of the dredge and other project associated equipment and exposed mud at the disposal sites. This is considered temporary and local natural vegetation would quickly take root improving the aesthetics within the first and second growing seasons.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar preserves. The study area includes Mandalay National Wildlife Refuge and Pointe Aux Chenes Wildlife Management Area. Direct impacts to wetlands in these areas will be mitigated for as part of the project.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. Cumulative effects on the coastal ecosystem would primarily be related to the incremental impact of all past, present, and future actions affecting water quality within the Basin such as: increase in fresh water areas; stabilization or decrease in salinities; increase in sediment introduction to the coastal zone, with accompanying minor increases in trace metals associated with bed sediments; increased total suspended sediments; increased turbidity; increased organic/nutrient enrichment of the water column; disturbance and release of possible contaminants; decrease in water temperatures along with fewer water temperature fluctuations; and increased dissolved oxygen levels. Temporary turbidity impacts may occur on- and off-site during construction of project features, but would be short-term in duration. Negative impacts due to loss of wetlands from creating the levee would be mitigated for. No long-term, negative cumulative impacts are anticipated.

h. Determination of Secondary Effects on the Aquatic Ecosystem. Indirect impacts to oyster leases could include increased rate of mortality and decrease in productivity in oyster leases located closest to the construction sites.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge

a. Adaptation of the Section 404(b)(1) Guidelines to this Evaluation were not significant.

b. 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 was met.

d. Compliance with Applicable Toxic Effluent Standard or Prohibition Under Section 307 of the Clean Water Act was met

e. The proposed action is compliant with the Endangered Species Act of 1973, as amended. The proposed action would not adversely affect endangered or threatened species or their critical habitats.

f. 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 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. There would be short-term direct impacts to municipal or private water supplies.

(b) Recreational and Commercial Fisheries. There would be short-term direct impacts to recreational and commercial fishing due to increases in turbidity, low DO, and introduction of dredged sediments into shallow open water areas. The immediate area would be unavailable for fishing during construction.

(c) Plankton. There would be short-term direct impacts to plankton populations due to increases in turbidity, low DO, and introduction of dredged sediments into shallow open water areas. There would be long-term loss of shallow water habitats in some areas due to dredge disposal activities. However, overall, there is an abundance of shallow open water habitat in the project area available for use by plankton.

(d) Fish. Temporary conditions would likely displace more mobile fisheries species from the construction area. Following construction, displaced fish would likely return to the project area.

(e) Shellfish. No measurable direct impacts to oysters are anticipated to result from placement of dredged material.

(f) Wildlife. Temporary low DO and turbidity caused by placement of dredged material is unlikely to affect wildlife.

(g) Special Aquatic Sites. The study area includes Mandalay National Wildlife Refuge and Pointe Aux Chenes Wildlife Management Area. There will be direct impacts to the refuge and management area anticipated from implementation of the proposed action. Wetlands are the major special aquatic sites in the project area. There would be loss of wetlands with the placement of material to create the levees. This loss of functions and values are being mitigated for by the creation of marsh.

(2) Significant Adverse Effects on Life Stages of Aquatic Life and Other Wildlife Dependent on Aquatic Ecosystems. Impacts to early life stages may occur during placement of dredged material, but they are expected to diminish after project completion. The mitigated marsh would provide a nursery area for early life stages of many fish and shellfish.

(3) Significant Adverse Effects on Aquatic Ecosystem Diversity, Productivity, and Stability. Ecosystem diversity and productivity would be expected to remain the same with the mitigation of wetland loss from building the levees.

(4) Significant Adverse Effects on Recreational, Aesthetic, and Economic Resources. Disposal of dredged material would have very little impact on recreational, aesthetic, and economic resources.

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 Sites for the Discharge of Dredged Material are (select one)

X (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: Rodney Mach and Eric Glisch

b. Project Description and Biological Input Prepared by: Coastal Environmental Planning section - Nathan Dayan

Review Responsibility

a. Water Quality Input reviewed by: Knoll Body
b. Project Description and Biological Input reviewed by: Sandra Stile

March 24, 2013
Date

fr Sandra Stile
Joan M. Exnicios
Chief, Environmental Planning
Branch

Appendix D

COASTAL ZONE MANAGEMENT PROGRAM CONSISTENCY

CONSISTENCY DETERMINATION

Louisiana Coastal Use Guidelines

Mississippi River and Tributaries
Morganza to the Gulf of Mexico, Louisiana Project

Terrebonne Parish, Louisiana

Revised Programmatic Environmental Impact Statement

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 approved state management programs." In accordance with Section 307, a Consistency Determination has been prepared for the proposed 1% Annual Exceedance Probability Storm Surge Risk Reduction System. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program, and 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.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of this project is to provide flood risk reduction for the communities located within the levee system. The goal is to maximize the number of residential and commercial structures protected from damage caused by hurricane storm surges. The project is needed because of the increasing susceptibility of coastal communities to storm surge due to wetland loss, sea level rise, and subsidence. Hurricanes and tropical storm tidal surges have caused immense property damage, human suffering, destruction of natural habitat, and loss of human life in the two-parish study area. While the TLCD is currently maintaining a system of forced drainage levees, pump stations, and flood control structures for Terrebonne Parish, adequate hurricane and storm risk reduction is not currently available for the entire area. This project represents an opportunity to reduce the risk of catastrophic hurricane and tropical storm damages by implementing an effective, comprehensive system for hurricane and flood risk reduction.

DESCRIPTION OF THE PROPOSED ACTION

1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative) provides risk reduction for water levels that have a 1% chance of occurring each year (see figure). This alternative includes programmatic elements that would be further investigated in the future and constructible elements for which this consistency determination would serve as the required documentation for the Coastal Zone Management Act. The features that have been identified as constructible include, Levee Reach F1 and F2, Levee Reach G1, HNC Lock Complex (HNC Lock), and Bayou Grand Caillou Floodgate (BGC floodgate).

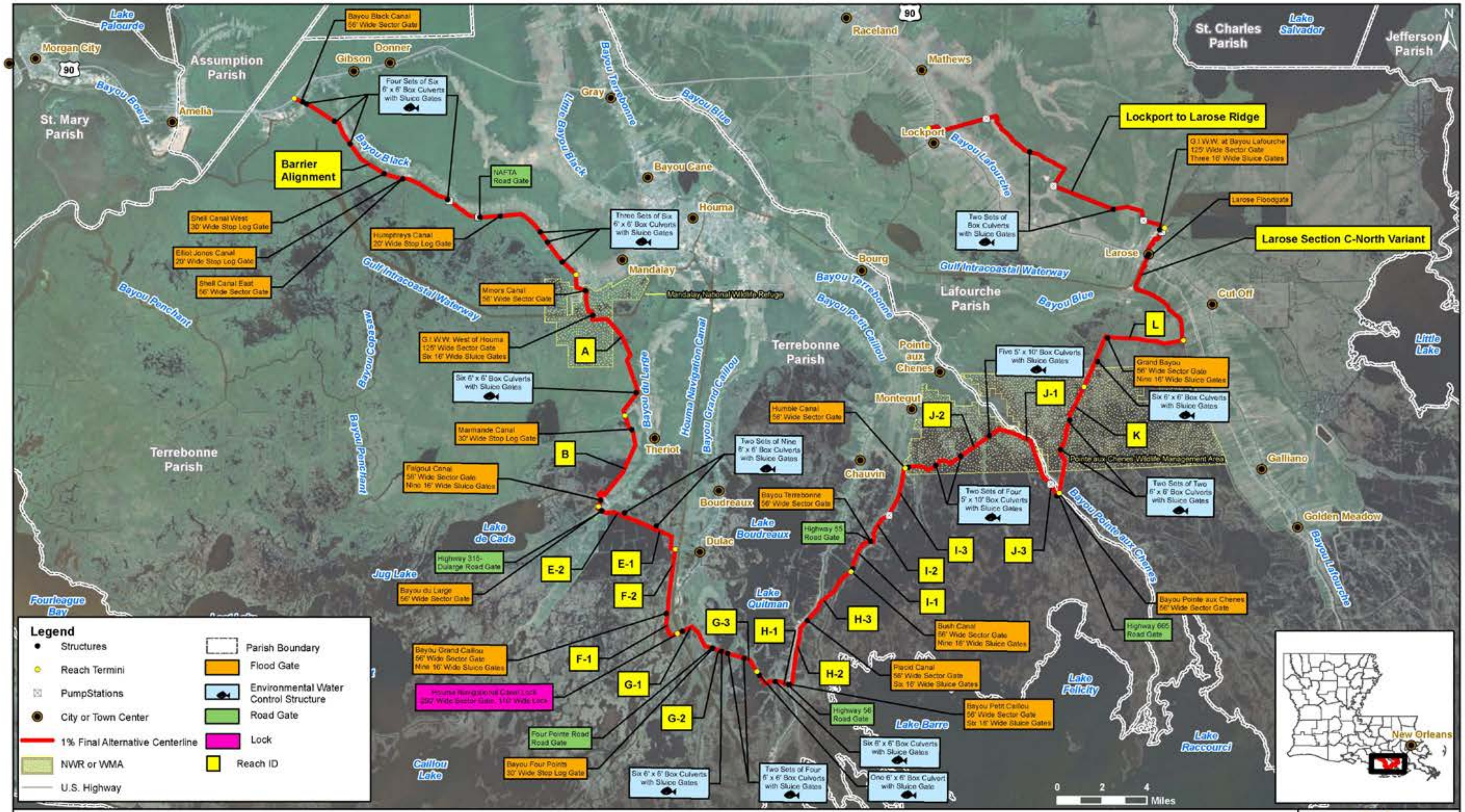


Figure 1. ALIGNMENT AND STRUCTURES OF THE 1% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE RISK REDUCTION SYSTEM ALTERNATIVE

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 1
Date: June 2012
Scale: 1:256,000
Source: USACE/GEC
Map ID: 273160010-2811

The 98-mile levee system would extend from high ground along US 90 near the town of Gibson and tie into Highway 1 near Lockport, LA in Lafourche Parish. Planned levee elevations range from 15.0 to 26.5 feet NAVD88. Toe-to-toe levee widths range from 282 feet to 725 feet. Twenty-two navigable floodgate structures, ranging in elevation from 17.0 to 33 feet (NAVD88), would be located on waterways throughout the levee system, including a lock complex on the HNC. Additionally, environmental water control structures would allow tidal exchange at 23 locations through the levee through sluice gates and box culverts.

Nine road gates would be located at the following levee/road crossings: NAFTA, Four Pointe Road, Highway 315 (DuLarge), Highway 55, Highway 56, Hwy 24, Hwy 3235, Union Pacific RR, and Highway 665. Fronting protection would be provided for four pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), and Hanson Canal pump stations.

Levees would be constructed using a combination of sidecast and hauled-in borrow materials. Adjacent side cast was planned for the pre-load section only. Borrow pits are oversized to offset the potential for encountering organics, expected losses, etc. The project would involve constructing 22 navigable floodgates, 23 environmental water control structures, nine road gates, and fronting protection for four existing pumping stations. Structures on Federally maintained navigation channels include the Houma Navigation Canal Lock Complex (and 250-ft sector gate) and two 125-ft sector gates on the GIWW east and west of Houma. In addition, thirteen 56-ft sector gates and five 20- to 30-ft stop log gates are located on various waterways that cross the levee system.

Implementation Schedule	
Activities	**Years for 1% AEP**
Real Estate Acquisition, Utility Relocations, and Mitigation	2014 to 2025
Construction of Structures	2015 to 2024
Construction of Levee Lifts to Achieve Base Year Elevations	2015 to 2035
Construction of Levee Lifts to Achieve Future Year Elevations	2035 to 2071

Acres of Wetlands Directly Effected			
Features	**Tidal Wetlands**	**Force Drained Wetlands**	**Total wetlands**
Constructible Features	644.35	25.98	670.33
Programmatic Features*	3,017	31	3,048
Total Impact	3,661	57	3,718

The constructible features would impact intermediate and brackish marsh, while the programmatic features has the potential to impact bottomland hardwoods, swamp, fresh, intermediate, brackish and saline marsh. Approximate 109 million cubic yards of earthen material (quality based on post-Katrina standards) would be used to build the complete levee alignment to its full height.

GUIDELINES APPLICABLE TO ALL USES

Response to Guidelines 1.1 - 1.6. The guidelines have been read in their entirety and all applicable guidelines would be addressed through the preparation of responses to the guidelines contained within the specific use categories. The proposed action would be in conformance with all applicable state water and air quality laws, regulations, and standards. Therefore, the proposed action is consistent with these guidelines.

Response to Guideline 1.7. This guideline has been read in its entirety and all applicable guidelines would be addressed through the preparation of responses to the guidelines contained within the specific use categories. The constructible features of the proposed action would directly impact approximately 670 acres of wetlands while the programmatic feature could potentially impact approximately 3,520 additional acres. During further studies for the programmatic features there is the potential to reduce the number of acres. There are no adverse effects to guidelines 1.7 a-d, g-k, m-q, and s-u. The impacts to guideline 1.7 e have been avoided to the maximum extent practicable and mitigation for wetland impacts are part of the plan. The impacts to guideline 1.7 f have been avoided to the maximum extent practicable but there is potential for induced damages outside the levee system. In order to prevent increased risk to people and structures, which are already located in high risk areas, a preliminary nonstructural compensation plan has been developed. The impacts to guideline 1.7 l, and r have been avoided to the maximum extent practicable the levee system has been designed with 21 environmental water control structures and 21 navigable structures so that reduction or blockage of water flow is not detrimental to the wetland habitat and species that use that habitat. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 1.8 – 1.10. The guidelines have been read in their entirety and all applicable guidelines would be addressed through the preparation of responses to the guidelines contained within the specific use categories. The proposed action would be in conformance with all applicable state water and air quality laws, regulations, and standards. Therefore, the proposed action is consistent with these guidelines.

GUIDELINES FOR LEVEES

Responses to Guideline 2.1 and 2.2. The guidelines have been read in their entirety. The impacts to biologically productive wetlands in guideline 2.1 have been avoided to the maximum extent practicable the alignment of the levee system was situated on or next to existing hydraulic barriers (roads, levees, natural ridges, canals) where ever practicable. Additionally the levee system has been designed with 23 environmental water control structures and 22 navigable structures so that reduction or blockage of water flow would be avoid or minimize segmentation of wetland areas. Parts of constructible features, HNC lock, and levee reach G1run across biologically productive wetlands, but have been designed to limit impacts to the maximum extent practicable. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 2.3. This guideline has been read in their entirety. The levee construction would not change the use of a wetland area. No additional areas would be put under pump with this proposed action and Jurisdictional standing of the wetlands would not change. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 2.4. This guideline has been read in its entirety. Part of the Hurricane and flood protection levee is being built on an existing levee and/or is located at the non-wetland/wetland interface or landward to the maximum extent practicable. Parts of constructible features, HNC lock, and levee reach G1run across biologically productive wetlands, but have been designed to limit impacts to the maximum extent practicable. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 2.5. This guideline has been read in its entirety. There are no impoundment levees as part of the proposed action. Therefore, this guideline is not applicable to the project.

Responses to Guideline 2.6. This guideline has been read in its entirety. The levee system has been designed with 21 environmental water control structures and 21 navigable structures so that reduction or blockage of water flow is limited. These designs used hydraulic models to analyses the potential impacts. Parts of constructible features, HNC lock, BGC floodgate, and levee reach G1run across biologically productive wetlands, but have been designed to limit impacts to the maximum extent practicable. The levee system would also be built and thereafter operated and maintained utilizing best practical techniques to minimize the impacts to the existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the levee system. Therefore, the proposed action is consistent with this guideline.

GUIDELINES FOR LINEAR FACILITIES

Responses to Guideline 3.1. The guideline has been read in its entirety. The proposed levee system, floodgate structures, water control structures, sluice gates and box culverts, road gates, pumping stations, the HNC lock complex, parallel borrow pits and other project features would avoid, to the maximum extent practicable, areas of high biological productivity, such as important estuarine habitats, and irreplaceable resource areas. In addition, project-induced impacts would be appropriately mitigated consistent with all applicable laws, regulations and policy. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 3.2. The guideline has been read in its entirety. The proposed levee system has been planned to avoid and minimize potential wetland and estuarine areas, to the maximum extent practicable. The alignment builds on existing hydrologic barriers, such as natural ridges, roadbeds, or existing levees that have been built for other purposes such as forced drainage or marsh management. Of the estimated 72 miles of levee originally proposed in the authorized alignment, approximately 15 miles would cross part of the estuaries that are currently open to estuarine exchange. Of the estimated 98 miles of levee in the PAC alternatives, approximately 14 miles would cross open estuaries. The levee reaches that are part of the constructible features are approximately 6% of the total 98 miles. The proposed project alternatives include numerous environmental water control structures to allow hydrologic exchange through the levees. Borrow is generally adjacent to the proposed levee alignment or hauled in from offsite. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 3.3. The guideline has been read in its entirety. The new channel that is part of the HNC Lock Complex would 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, to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm generated surges. The HNC Lock and Flood gate would be built in the new channel and would be used as part of this project to reduce saltwater intrusion. Adjacent borrow pits have been planned for the pre-load section only of some reaches. The top 5 ft of borrow material from adjacent borrow pits is not suitable for levee building because of it organic makeup. Approximately 12,305,000 cubic yards of this organic material would be available for beneficial use to create marsh for the required compensable mitigation. The remaining dredge material from the adjacent pits would be used beneficially to create the levees. No new disposal areas are required. For the constructible features dredged material (spoil) would come from the bypass channel and HNC lock area and adjacent borrow pits flood side levee reaches F1 and F2 and the protected side of levee reach G1. These sites have been designed to the minimum practical size and length. Therefore, the proposed action is consistent with this guideline. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.4. This guideline has been read in its entirety. This proposed action would not directly include the construction pipelines. There would be requirement for the relocation of some linear facilities (pipelines, power lines, etc.), these actions 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.

Responses to Guideline 3.5. The guideline has been read in its entirety. The proposed levee system has been planned to avoid and minimize potential wetland and estuarine areas, to the maximum extent practicable. The alignment builds on existing hydrologic barriers, such as natural ridges, roadbeds, or existing levees that have been built for other purposes such as forced drainage or marsh management. Of the estimated 72 miles of levee originally proposed in the authorized alignment, approximately 15 miles would cross part of the estuaries that are currently open to estuarine exchange. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.6. The guideline has been read in its entirety. 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. The proposed levee system has, to the maximum extent practicable, been designed and will be constructed to permit multiple uses consistent with the features. For example, several reaches of the levee system are planned through existing pasture lands and once construction is complete would be have an easement which allows multiple uses, compatible with the facility, by the private landowner. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.7. The guideline has been read in its entirety. The proposed action involving dredging would not traverse or adversely affect any barrier island. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.8. The guideline have been read in its entirety. The proposed action involving dredging would not traverse or adversely affect any beaches, tidal passes, protective reefs or other natural gulf shoreline. Therefore, these guidelines are not applicable to the project and the proposed action is consistent with these guidelines.

Responses to Guideline 3.9. The guideline have been read in its entirety. The proposed project features have been be planned, designed, located and will be constructed 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. The new channel that is part of the HNC Lock Complex would 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, to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm-generated surges. The HNC Lock and Flood gate would be built in the new channel and would be used as part of this project to reduce saltwater intrusion. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.10. The guideline have been read in its entirety. Proposed project features have been planned, designed, and will be constructed 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. The new channel that is part of the HNC Lock Complex would 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, to prevent bank slumping and erosion, saltwater intrusion, and to minimize the potential for inland movement of storm-generated surges. The HNC Lock and Flood gate would be built in the new channel and would be used as part of this project to reduce saltwater intrusion. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 3.11. This guideline has been read in its entirety. There are no non-navigation canals, channels, and ditches which connect more saline areas with fresher areas that are part of the proposed alternatives. Therefore, this guideline is not applicable to the project and the proposed action is consistent with these guidelines.

Responses to Guideline 3.12. This guideline has been read in its entirety. The multiple use of existing canals, directional drilling and other practical techniques would 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. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 3.13. This guideline has been read in its entirety. This proposed action would not directly include the construction pipelines. There would be requirement for the relocation of some pipelines, power lines, etc., these actions would 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. Therefore, this guideline is not applicable to the project at this time.

Responses to Guideline 3.14 to 3.16. The guidelines have been read in their entirety. Areas dredged for linear facilities would be backfilled or otherwise restored to the pre-existing conditions upon cessation of use for navigation purposes to the maximum extent practicable, the best practical techniques for site restoration and re-vegetation would be utilized for all linear facilities, confined and dead end canals would be avoided to the maximum extent practicable. Approved canals would be designed and constructed using the best practical techniques to avoid water stagnation and eutrophication. Therefore, the proposed action is consistent with these guidelines.

GUIDELINES FOR DREDGED MATERIAL DEPOSITION

Responses to Guideline 4.1. This guideline has been read in its entirety. Adjacent borrow pits have been planned for the pre-load section only of some reaches. For the constructible features dredged material (spoil) would come from the bypass channel and HNC lock area and adjacent borrow pits flood side levee reaches F1 and F2 and the protected side of levee reach G1.

Dredged material would be deposited utilizing the best practical techniques to avoid disruption of water movement, flow, circulation, and quality in the creation of the levee system and marsh mitigation areas. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 4.2. This guideline has been read in its entirety. The top 5 ft of borrow material from adjacent borrow pits is not suitable for levee building because of it organic makeup. Approximately 12,305,000 cubic yards of this organic material would be available for beneficial use to create marsh for the required compensable mitigation. The remaining dredge material from the adjacent pits would be used beneficially to create the levees. No new disposal areas are required. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 4.3. This guideline has been read in its entirety. The levee construction would not be disposed of in a manner which could result in the impounding or draining of wetlands or the creation of development sites no additional areas would be put under pump with this proposed action and Jurisdictional standing of the wetlands would not change. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 4.4. This guideline has been read in its entirety. The levee alignment and width has been designed to reduce the deposition of dredge material on marsh and submersed vegetation to the maximum extent practicable. There are no direct depositions on known oyster or clam reefs. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 4.5 to 4.7. The guidelines have been read in their entirety. No dredged material would be disposed of in such a manner as to create a hindrance to navigation or fishing, or hinder timber growth, disposal areas would be designed and constructed and maintained using the best practical techniques to retain the material at the site, reduce turbidity, and reduce shoreline erosion when appropriate, and no state-owned property would be alienated due result from dredge material deposition activities without the consent of the Department of Natural Resources. Therefore, the proposed action is consistent with these guidelines.

GUIDELINES FOR SHORELINE MODIFICATION

Responses to Guideline 5. 5 and 5.6. The guidelines have been read in their entirety. Under the constructible features there would be shoreline modification as part of the HNC Lock complex. Non-structural methods of shoreline protection would be utilized to the maximum extent practicable, s shoreline modification structures would be designed and built using best practical techniques to minimize adverse environmental impacts, would be lighted or marked in accordance with U.S. Coast Guard regulations, not interfere with navigation, and should foster fishing, other recreational opportunities, and public access, and would be built using best practical materials and techniques to avoid the introduction of pollutants and toxic substances into coastal waters. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 5.5 and 5.6. The guidelines have been read in their entirety. There are no piers and docks and other harbor structures or Marinas being built as part of the proposed action. Therefore, these guidelines are not applicable to the project.

Responses to Guideline 5.7. This guideline has been read in its entirety. Neglected or abandoned shoreline modification structures, piers, docks, mooring and other harbor structures would be removed at the owner's expense, when appropriate. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 5.8. This guideline has been read in its entirety. Shoreline stabilization structures are being built for the purpose of creating fill areas as part of the HNC

Lock complex a public works project covered under Guideline 6.2 of the Guideline for Surface Alterations below. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 5.9. This guideline has been read in its entirety. There are no jetties, groins, breakwaters, and similar structures being built as part of the proposed action. Therefore, this guideline is not applicable to the project.

GUIDELINES FOR SURFACE ALTERATIONS

Responses to Guideline 6.1. This guideline has been read in its entirety. The proposed action would not add any new industrial, commercial, urban, residential, and recreational uses. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.2. This guideline has been read in its entirety. The proposed levee systems protects areas suitable for development pursuant to Guideline 6.1, are consistent with the other guideline and are consistent with all relevant adopted state, local and regional plans.

Responses to Guideline 6.3. BLANK (Deleted)

Responses to Guideline 6.4. This guideline has been read in its entirety. The levee alignment and width has been designed to reduce the deposition of dredge material in wetlands. Dredged material would be deposited utilizing the best practical techniques to minimize present and future property damage and adverse environmental impacts. Compensatory mitigation for the value of the wetlands is part of the proposed action. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.5. This guideline has been read in its entirety. This proposed action would not include Coastal water dependent uses. Therefore, this guideline is not applicable to the project.

Responses to Guideline 6.6 and 6.7. The guidelines have been read in its entirety. Areas modified by surface alteration activities (temporary access roads, staging area, etc.) would to the maximum extent practicable, be re-vegetated, refilled, cleaned, and restored to their predevelopment condition upon termination of the use as part of the proposed action. Site clearing would to the maximum extent practicable be limited to those areas immediately required for physical development as part of the proposed action. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 6.8. This guideline has been read in its entirety. Surface alterations would, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Coordination has occurred and would continue with US Fish and Wildlife service and Louisiana Department of Fish and Wildlife concerning construction in the Mandalay National Wildlife Refuge and Pointe Aux Chenes Wildlife Management Area. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.9. This guideline has been read in its entirety. There are no planned surface alterations which have high adverse impacts on natural functions on barrier islands and beaches, isolated cheniers, isolated natural ridges or levees, or in wildlife and aquatic species breeding or spawning areas, or in important migratory routes. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.10. This guideline has been read in its entirety. The proposed action does not create low dissolved oxygen conditions in the water or traps for heavy metals. Therefore, this guideline is not applicable to the project.

Responses to Guideline 6.11 This guideline has been read in its entirety. The surface mining that is part of the proposed action would be carried out utilizing the best practical techniques to minimize adverse environmental impacts. Offsite borrow locations would be located in not wetland areas and would be covered in future modification request for the programmatic features. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.12. This guideline has been read in its entirety. The proposed action would not create underwater obstructions. Therefore, this guideline is not applicable to the project.

Responses to Guideline 6.12. This guideline has been read in its entirety. Surface alteration sites that are part of the proposed action would 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. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 6.12. This guideline has been read in its entirety. The proposed action would use material that is free of contaminants and compatible with the environmental setting as fill. Therefore, the proposed action is consistent with this guideline.

GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

Responses to Guideline 7.1 to 7.4. The guidelines have been read in its entirety. There are no planned controlled diversion of sediment-laden waters, sediment deposition system, siphons, and controlled conduits in the proposed alternative. Therefore, these guidelines are not applicable to the project.

Responses to Guideline 7.5 to 7.7. The guidelines have been read in their entirety. The levee system has been designed with 21 environmental water control structures and 21 navigable structures so that reduction or blockage of water flow would be avoid. The constructible features (HNC Lock and Floodgate and BGC Floodgate) and the associated water management plans would result in an overall benefit to the productivity of the area due to the use of the lock to limit saltwater intrusion based on system wide and structure specific hydraulics models. All of the water control structures were modeled as part of the system wide model. As the programmatic features are designed future assessments of their merits would be done. Weirs and similar water control structures would be designed and built using the best practical techniques to prevent "cut arounds," permit tidal exchange in tidal areas, and minimize obstruction of the migration of aquatic organisms. Therefore, the proposed action is consistent with these guidelines.

Responses to Guideline 7.8. This guideline has been read in its entirety. The levee system has been designed with 21 environmental water control structures and 21 navigable structures to limit impoundments which prevent normal tidal exchange and/or the migration of aquatic organisms would not be constructed in brackish and saline areas to the maximum extent practicable. Therefore, the proposed action is consistent with this guideline.

Responses to Guideline 7.8. This guideline has been read in its entirety. There is no withdrawal of surface and ground water as part of the proposed alternative. Therefore, this guideline is not applicable to the project.

GUIDELINES FOR DISPOSAL OF WASTES

Responses to Guideline 8.1 to 8.9 .The guidelines have been read in their entirety. The proposed action 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

Responses to Guideline 9.1 to 9.3. The guidelines have been read in their entirety. The proposed action would not involve the alteration of waters draining into coastal waters and, therefore, these guidelines are not applicable.

GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

Responses to Guideline 10.1 to 10.19 The guidelines have been read in their entirety. The proposed action 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 action is consistent with the guidelines for all uses, levees, linear facilities, dredged material deposition, shoreline modification, surface alterations, and hydrologic and sediment transport. Based on this evaluation, 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.

From: Brian Marcks
To: Dayan, Nathan S MVN
Cc: Jeff Harris
Subject: C20130001 Mitigation for Morganza to Gulf RPEIS
Date: Friday, January 18, 2013 2:20:20 PM

Nathan,

I have some comments on mitigation from OCM staff that need to be addressed with this project. They have indicated to me that OCM will expect mitigation for project in accordance with the Louisiana Coastal Resources Program, which may be different than the requirements of NEPA, WRDA and other statutes. We recommend that your mitigation staff get in touch with Kelley Templet, our Mitigation Program Manager at 225-342-3124 or email her at Kelley.Templet@LA.GOV. at the earliest practical time in order to avoid the need for last-minute changes.

One of the requirements for mitigation will be that compensatory mitigation be carried out concurrently with project construction impacts. We would also like to see an estimated time schedule of mitigation planning and construction for the project. Also, please provide a justification for the use of WVA's for habitat analysis, rather than the use of the Modified Charleston Method that the Regulatory Branch of the Corps currently uses.

Finally, I will have some other comments/questions later on the Guideline responses that I hope to get to you early next week.

Brian Marcks

Consistency Analyst

From: Brian Marcks
To: Dayan, Nathan S MVN
Cc: Jeff Harris
Subject: C20130001 RPEIS Morganza to the Gulf
Date: Thursday, January 24, 2013 8:39:58 AM

Nathan,

Below are some problems we have with the Corps responses to some of our Coastal Use Guidelines in the RPEIS:

Guideline 2.6. In the third sentence the word designed should probably be designs. Also note two periods at the end of that sentence. In the fifth sentence there seems to be a couple of words missing after the word minimize. Perhaps the missing words should be impacts to.

Guidelines for linear facilities

Guideline 3.1 to 3.16. The second sentence is not how we interpret construction of linear facilities. We consider the entire levee, floodgates, parallel borrow pits, etc., to be a linear facility and all of the Guidelines under this section from 3.1 to 3.16 must be treated and evaluated as a linear facility that will have certain hydrological or boundary effects on the ecosystem or land uses.

Please let us know if you have any problems with these comments and/or make changes as necessary. We will likely have addition comments for you as we get responses back from the various commenting agencies.

Brian Marcks

Dayan, Nathan S MVN

From:	Brian Marcks [Brian.Marcks@LA.GOV]
Sent:	Tuesday, February 19, 2013 11:05 AM
To:	Dayan, Nathan S MVN
Cc:	Jeff Harris
Subject:	FW: Emailing: C20130001
Attachments:	C20130001.pdf; C20130001.doc

Nathan,

Attached are the LDWF comments on the RPEIS for the Morganza to the Gulf project that will need to be resolved before we can issue a Consistency decision and concurrence letter on the project. Since our 60 day review period for this project ends March 1, I anticipate we will shortly send you a 15-day time extension letter to March 15, which we are allowed to do by law. If there are issues that cannot be resolved within that period, we will need to mutually agree to say a further 30 time extension or whatever, to finish the resolution of environmental issues in order for us the render a consistency decision. If that is not possible, you may have to withdraw the project and resubmit it at a later time when these issues are resolved. Thanks for your consideration in this matter.

Brian Marcks

-----Original Message-----
From: Butler, Dave [mailto:dbutler@wlf.la.gov]
Sent: Tuesday, February 19, 2013 10:37 AM
To: Brian Marcks
Cc: gutierrez.raul@epa.gov; 'patrick.williams@noaa.gov'; 'Patti Holland'
Subject: Emailing: C20130001

Brian,
Here are LDWF comments regarding C20130001.

Thanks,

Dave Butler
Permits Coordinator
Louisiana Department of Wildlife and Fisheries P.O. Box 98000 Baton Rouge, LA 70898-9000
Office: 225-763-3595
Fax: 225-765-2625

copied, audited, inspected, and disclosed to Department of Natural Resources and law enforcement personnel. By using this system the user consents to such interception, monitoring, recording, copying, auditing, inspection, and disclosure at the discretion of DNR.

BOBBY JINDAL
GOVERNOR

State of Louisiana
DEPARTMENT OF WILDLIFE & FISHERIES

ROBERT J. BARHAM
SECRETARY

February 15, 2013

Keith Lovell, Administrator
Louisiana Department of Natural Resources
Office of Coastal Management
P.O. Box 44487
Baton Rouge, LA 70804-4487

RE: *Application Number: C20130001 (RPEIS Mississippi River and Tributaries–Morganza to the Gulf of Mexico)*
Applicant: U.S. Army Corps of Engineers-New Orleans District
Notice Date: January 4, 2013

Dear Mr. Lovell:

We have reviewed the Revised Programmatic Environmental Impact Statement (RPEIS) for the U.S. Army Corps of Engineers (USACE) and the Terrebonne Levee District (TLD) Morganza to the Gulf Levee Project. The Department of Wildlife and Fisheries (LDWF), as a member of the Habitat Evaluation Team (HET), has worked closely with other regulatory and resource agencies to provide comments and recommendations throughout the process. We fully understand the need for hurricane protection measures to provide protection to coastal communities. The livelihoods of many Louisiana residents depend on productive estuaries, and our main concern is that while these resident's homes and infrastructure may be protected, their livelihoods may suffer if the proposed levee negatively impacts fisheries and wetland habitat.

Our concerns with the RPEIS fall into 3 categories: 1) Design and Operation Issues, 2) Inadequate Fisheries Impact Analysis, and 3) Inadequate Mitigation and Cumulative Impacts Analysis. In general, given the scale of this project and the changes in hydrology that would result, LDWF feels that the RPEIS does not adequately address potentially substantial long-term, indirect impacts to fisheries and wetland habitat.

1) Design and Operation Issues:

Recently, information being presented to the HET has been both insufficient and inconsistent, particularly flood gate and environmental structure design and operation plans. Information has been provided to the HET in a confusing piecemeal fashion with unrealistic review and comment deadlines. The cumulative impacts of structural protection to the productivity and sustainability of Louisiana's estuarine areas are difficult to determine. Exacerbating this difficulty is the fact that predictive modeling efforts have been hindered by changing structure design and uncertain operation criteria. Of particular concern is the high probability that flood gates and environmental structures will be closed more frequently and for longer periods in the future for salinity control purposes, which strongly suggests increasing fisheries and wetland impacts with time. We suggest that these important design and operation uncertainties be resolved immediately so that reliable predictions of impacts can be determined.

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2) Inadequate Fisheries Impact Analysis:

We feel that potential impacts to fisheries production are not adequately quantified using Wetland Value Assessment (WVA) methodology given the size of the project area. Any attempt to assess potential impacts to 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 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 several environmental control structures have been implemented into the project 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. 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 fisheries.

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. Species of concern include white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), blue crab (*Callinectes sapidus*), eastern oyster (*Crassostrea virginica*), gulf menhaden (*Brevoortia patronus*), redfish (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus)*, black drum (*Pogonias chromis*), striped mullet (*Mugil cephalus*), bay anchovy (*Anchoa mitchilli*), and Atlantic croaker (*Micropogonias undulatus*). The RPEIS needs to address if and how these species will be affected, if possible using other substantial levee projects as examples (i.e. eastern Calcasieu Lake).

The RPEIS should 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.

3) Inadequate Mitigation and Cumulative Impacts Analysis:

A detailed wetland and fisheries mitigation plan outlying specific projects should be included in the document. In order to be considered adequate, this plan must consider short and long-term direct and indirect impacts to wetland and fisheries production, which at this time is not present in the RPEIS. Any mitigation plan should include long-term monitoring and be adaptive in nature to account for unforeseen future impacts.

Throughout the document, it is suggested that other local, state, and federal wetland restoration projects in the area will mitigate the impacts of levee construction and operation, and that the levee itself is a form of wetland and fisheries restoration. It would be more appropriate to discuss potential restoration projects, their interaction with the levee, and ecosystem response in a separate section; and to clarify that these projects are not part of the levee mitigation plan. We feel that the environmental benefits of levee construction are exaggerated throughout the document. The only clear benefit that a levee would have on wetland habitat would be preventing wetland loss 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. Similarly, the sporadic protection of fish habitats could be outweighed by long-term alteration and degradation of fish habitat and access to and from critical habitats. Additional fisheries production impact analysis (with and without separate restoration projects) for each species of concern listed above should also be conducted. Provided that restoration projects include freshwater introductions, how these projects would influence structure operation (closure time and during) should be considered along with the predicted impacts on the species listed above.

Given that other state/federal coastal restoration projects are suggested as mitigation for levee construction in the RPEIS, we believe these restoration projects deserve more discussion in the "No Action Alternative" scenarios. These separate local, state, and federal restoration projects are better suited to address the described coastal land loss issues than levee construction, where the primary goal is infrastructure protection. It should also be discussed in the 1% and 3% AEP Alternative sections if and how the presence of a levy could negatively impact the effectiveness of other 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).

Finally, cumulative impact benefits resulting from levee construction need supporting evidence, especially when most benefit appears to be provided by other restoration programs and negative impacts from the presence of a levee are more likely. It is stated in the RPEIS that hydrologic/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. We find it very troubling that cumulative impact sections in the main RPEIS document list only benefits and minimal impacts, where in Appendix C it is indicated that more frequent and longer duration structure closures in the future would lead to more substantial impacts.

Comments on specific portions of the RPEIS are as follows:

Fisheries Habitat:

Section 6.5.2

This part of the document needs clarification on reductions in salinities and it's affects on both inside and outside the system. One might expect accelerated salinities in some oyster areas and outside the system and/or depending on operations of structures and environmental conditions.

This section discusses inclusion of environmental structures, it should be mentioned that the structures provide hydrological benefits; however, there is a lack of research on fish passage through various structures. Furthermore, increased feeding opportunities at structures on bait fish could augment the natural process.

There are no detailed descriptions of closure impacts due to timing and duration especially with regards to increased sea level rise.

It is difficult to link the statement "improvement in marsh habitats and increased SAV would benefit fisheries resources", when access may be reduced.

Section 6.14.5

Discussion, in this section or another, may be warranted regarding non-structural alternatives, including but not limited, elevating structures and roads.

Section 6.16.2

There are concerns that the boating access issue is not adequately addressed with respect to frequency of closures. Also, the document did not seem to address recreational and commercial boats being trapped outside the system during storm events, subsequent closures and associated economic impacts.

Louisiana Natural Heritage Program:
Our Natural Heritage Program (LNHP) records indicate that the proposed project may potentially impact a Bald Eagle (*Haliaeetus leucocephalus*) nesting site. This species is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) and the Migratory Bird Treaty Act (16 U.S.C. 703-712) and is protected by the state of Louisiana. This proposed project is less than 1,000 ft. away from the bald eagle nest of concern. All bald eagle nests (active, inactive or seemingly abandoned) should be protected, and no large trees should be removed. Please refer to the Bald Eagle Management Guidelines for more information on avoiding impacts to bald eagles: http://www.fws.gov/southeast/es/baldeagle/. If additional information is needed contact the LNHP zoologist at 337-491-2576 Ext 3019.

Our LNHP database indicates the presence of bird nesting colonies within one mile of this proposed project. **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 (700 meters for brown pelicans) 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. In addition, colonies should be surveyed by a qualified biologist to document species present and the extent of colonies. Provide LDWF with a survey report which is to include the following information:

1. qualifications of survey personnel;
2. survey methodology including dates, site characteristics, and size of survey area;
3. species of birds present, activity, estimates of number of nests present, and general vegetation type including digital photographs representing the site; and
4. topographic maps and ArcView shapefiles projected in UTM NAD83 Zone 15 to illustrate the location and extent of the colony.

Please mail survey reports on CD to: Louisiana Natural Heritage Program
La. Dept. of Wildlife & Fisheries
P.O. Box 98000
Baton Rouge, LA 70898-9000

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 (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).

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 Habitat Section biologist Chris Davis at 225-765-2642 or Barry Hebert at 225-765-0233 should you need further assistance.

Sincerely,

Jimmy Anthony
Assistant Secretary

cd/cm/bh/sb

c: EPA Marine & Wetlands Section
USFWS Ecological Services
Patrick Williams, NOAA-NMFS

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GOVERNOR

STEPHEN CHUSTZ
INTERIM SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

March 28, 2013

Joan M Exnicios
Chief, Environmental Compliance Branch
Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

RE: **C20130001,** Coastal Zone Consistency
New Orleans District, Corps of Engineers
Direct Federal Action
Draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River & Tributaries-Morganza to the Gulf, **Terrebonne and Lafourche 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. The project, as proposed in this application, is consistent with the LCRP.

If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7939 or 1-800-267-4019.

Sincerely,

Keith Lovell
Acting Administrator
Interagency Affairs/Field Services Division

KOL/JDH/bgm

cc:
Nathan Dayan, COE-NOD
James McMenis, CPRA
David Butler, LDWF
Ronny Paille, USFWS
Patrick Williams, NMFS
Jon Ettinger, USEPA
Reggie Dupre, TLCD
Kirk Kilgen, OCM FC
Rod Pierce, OCM FC
Archie Chaisson, Lafourche Parish
James Miller, Terrebonne Parish

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Appendix E

PUBLIC COMMENTS

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
NRCS-A1	Permits	No impacts to unique/prime farmland.	Comment noted.	RPEIS, Section 7
DEQ1	Permits	No objections.	Comment noted	NA
DEQ2	Permits	Obtain necessary approvals and environmental permits (e.g. LPDES).	All required LPDES permits will be obtained at the time of construction as needed.	NA
DEQ3	Permits	If work is located in wetlands, contact the Corps for permitting.	A 404(b)(1) evaluation was prepared for the constructible features see Appendix C of the RPEIS. When the NEPA documents for the programmatic features are prepared a 404(b)(1) evaluation will be prepared if needed.	RPEIS, Section 7; Appendix C
DEQ4	Air	Terrebonne and Lafourche Parishes are classified as attainment with the National Ambient Air Quality Standards.	Comment noted.	RPEIS, Section 7
OCM1	Mitigate	Contact the Mitigation Program Manager.	Contact was made.	NA
OCM2	Mitigate	Compensatory mitigation should be carried out concurrently with project construction impacts. Requested an estimated time schedule of mitigation planning and construction for the project.	Compensatory mitigation would be concurrent with initial construction impacts. The current construction schedule assumes that most of the mitigation would occur between 2015 and 2024, which is when the initial levee lifts and structures would be constructed.	RPEIS, Section 6.19; Appendix K
OCM3	Mitigate	Provide a justification for doing WVAs rather than the Modified Charleston Method that the USACE Regulatory Branch uses.	The modified Charleston method is not a certified model. It does not provide for a 50 year project life in that it provides for impacts now but not a comparison of with and without project in the future.	NA
OCM4	Editorial/Typos	Typos in the RPEIS related to Guideline 2.6.	Changes were made to the consistency determination included in Appendix D of the RPEIS.	RPEIS Appendix D
OCM5	Coastal Use Guidelines	Guideline 3.1 to 3.16 – RPEIS is inconsistent with how LADNR/OC interprets linear facilities.	Response to Guidelines 3.1 to 3.16 have been revised and addressed consistent with LADNR/OC interpretation of linear facilities.	RPEIS Appendix D
NRCS-L1	Direct & Constructibility	Reaches A, G1-G3, H1 & J2 are of concern because of direct impact to wetlands and constructability. NRCS encourages every effort to avoid and minimize impact to sensitive floating marsh in the footprint of each reach.	Attempts have been and will continue to be made to avoid and minimize impacts to all wetland types including floating marsh. During detailed design done during the PED phase an updated NEPA document will be produce that will demonstrate the avoidance and minimization and impacts.	RPEIS, Section 3.5.2; 6.19; Appendix K
NRCS-L2	Direct & Constructibility	Reaches A, G1-G3, and H1 have constructability and maintenance concerns. NRCS encourages alignment that minimizes potential for failure and minimizes/avoids destruction of sensitive marsh areas.	Attempts have been and will continue to be made to avoid and minimize impacts to all wetland types. During detailed design done during PED we will evaluate the construction alignment to minimize the impact to marsh areas and to minimize failure potential. We will employ sound design and construction principles based on the soil conditions in the area. Additional geotechnical field data will be collected to better classify these soil conditions.	RPEIS, Section 3.5.2; 6.19; Appendix K
NRCS-L3	Mitigate	Expect mitigation for areas within Pointe aux Chenes WMA to involve LDWF to offset losses for unavoidable losses.	Coordination with LDWF personnel has occurred and will continue during the design (PED) and construction phases of the portion of the project located in the Pointe aux Chenes WMA.	RPEIS, Section 3.5.2; 6.19; Appendix K
NRCS-L4	GIWW/size change	Encourage consideration of envir consequences of operating flood control structure in GIWW; request eval of dimensions so as to not impede beneficial conveyance to areas of need during normal periods of flow.	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	RPEIS, Section 3.5.1
NRCS-L5	Eco Proj	Support dual purpose of lock, and encourage dev of operations plan for optimal envir benefit w/o compromising other purposes.	Concur, the CEMVN supports the multipurpose use of the HNC Lock Complex to include environment enhancements as planned under the LCA program. The project was designed to not interfere with existing and proposed ecosystem restoration projects. Use of the GIWW to divert freshwater is not a component of the Morganza project, but is a component of the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project. The LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project is authorized by Congress and therefore should be considered as part of the future without and future with project conditions. The reason that the State requested that the LCA projects be put on hold was not based on the Morganza to the Gulf project. There was no determination by the State that the project would interfere with the LCA projects. In addition, a project similar to the LCA project is included in the State 2012 Master Plan. Furthermore, funding from the recent Deepwater Horizon oil spill fines will be released to impacted states, including Louisiana, for ecosystem restoration efforts. Hence, the authorized LCA project is a reasonably foreseeable project and should be addressed in both the future without and future with project conditons.	NA

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NRCS-L6	Indirect	Concern for areas of sensitive marsh and swamp (impedance of hydrology and detrimental wetlands effects) both inside and outside project that will be impacted and anticipate thorough justification when details emerge.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Section 3.5.1; Appendix F
NRCS-L7	Indirect/gate closures	23 envir water control structures should also allow for localized drainage; encourage thorough hydro modeling of areas that potentially could be impounded to min unanticipated hydro condition that adversely affect marshes.	During the PED phase Hydro modeling will occur to look for areas of isolated drainage and modifications to the designs will occur. This will be document in supplemental NEPA Documents.	RPEIS, Summary; Section 3.5.1; Appendix F
LPC1	Realign/Gheens	Lafourche Parish Council adopted a resolution requesting that the USACE include the Gheens community to Highway 90 in the Morganza project.	Morganza to the Gulf of Mexico, Louisiana was authorized for construction in the Water Resources Development Act (WRDA) of 2007 (PL-110-114), in accordance with Chief of Engineer's Reports dated August 2002 and July 2003 and a Feasibility Report dated 2002. The project area designated in these reports and authorized for construction lies south of Bayou Lafourche. The 2013 Post Authorization Change (PAC) Report incorporates post-Katrina Hurricane and Storm Damage Risk Reduction (HSDRRS) design criteria into the project designed in the 2002 Feasibility Report and authorized in the 2007 WRDA. The new HSDRRS criteria includes a new method for modeling storm surge inundation; as a result of the new modeling, the 2013 PAC Report predicts deeper and more widespread flooding in a 100-year event than was predicted in the 2002 Feasibility Report. For example, the 2002 Report did not predict that storm surge from a 100-year event would overtop the Bayou Lafourche ridge from the north and cause flooding in the Morganza project area south of Bayou Lafourche. The new modeling shows a statistical probability that a 100-year event could overtop the Bayou Lafourche ridge; in order to maintain the integrity of a 100-year Level of Risk Reduction for the authorized project area, the levee alignment has been extended. We do not have the authority to expand the project area under the current Morganza to the Gulf project authorization. Three options for pursuing a Federal flood risk reduction system for Gheens include: (a) For projects with construction costs of $7M or less, a flood risk reduction system could be investigated under the Corps CAP (Continuing Authorities Program) project authority. (b) Congress could direct the Corps to incorporate Gheens into the Morganza to the Gulf project area. (c) The Corps and the Non-Federal sponsor could agree to investigate a Locally Preferred Plan (LPP) in a future Morganza to the Gulf Post Authorization Change (PAC) report that would extend the levee alignment to include Gheens. In order for an LPP to be recommended, the LPP must be economically justified (BCR greater than 1.0) and any difference (increase) in construction cost must be funded 100% by the Non-Federal sponsor.	
USFWS1	Indirect/gate closures	...changes in the design and operation of some project features (constructable and programmatic features) were made late in the planning and evaluation process without the knowledge of the HET. Because the HET was not informed of those changes, the HET has not assessed environmental effects of those changes. Consequently, the project impacts disclosed in the RPEIS are incomplete.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F

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USFWS2	Indirect/gate closures	The salinity closure criterion for the Houma Navigation Canal (HNC) Lock was very recently revised but is still not yet fully developed. As a result, indirect impacts of this constructable feature cannot be determined until the closure criterion is determined.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS3	Indirect/gate closures	Additionally, there is little data available to assess the effects of the proposed salinity criterion for reopening the HNC Lock. Consequently, one cannot determine the duration of HNC Lock closures. It appears that project planning for this feature has not yet progressed such that it may be considered ready for a feasibility level analysis.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
USFWS4	Indirect/gate closures	...clarify the operation plan and make all references to structure operation and impacts consistent with the clarified operation plan.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F

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USFWS5	Indirect/gate closures	If those floodgates will be closed for non-storm high stage events as the RPEIS indicates, then there will be substantial indirect impacts. Consequently, the RPEIS conclusion that there would be minimal indirect impacts is inaccurate.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS6	GIWW & Indirect/gate closures	According to the PAC Report and RPEIS, the design of the west Gulf Intracoastal Waterway (GIWW) floodgate has been changed. Because hydrologic modeling was previously conducted using a larger structure design, that modeling to determine system-wide indirect impacts has potentially been invalidated due to this recent design change. To properly satisfy the disclosure requirements of NEPA, the indirect impact assessments need to be redone for some constructable and programmatic project features in the final RPEIS.	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	RPEIS, Summary; Section 3.51; 3.5.2; 6.18; 6.19; Appendix F and K
			A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.51; 3.5.2; 6.18; 6.19; Appendix F and K
USFWS7	Mitigate/Costs	Because substantial indirect impacts may result from the operation plan for the constructable features, mitigation costs for those features could increase considerably. Costs for programmatic features are also subject to substantial increases due to uncertainties such as availability of suitable borrow and mitigation for indirect impacts. These uncertainties and potential cost increases should be reflected in project cost estimates.	Development of the updated $10.3 billion cost estimate for the 1% AEP plan included a cost and schedule risk analysis. As part of the risk analysis, high risk cost items were identified including structural and geotechnical uncertainty, steel cost, fuel cost, unidentified borrow pit for hauled in material, and construction modifications. Based on the risk analysis, a contingency of 25% was applied to borrow real estate costs, 26% was applied to the mitigation costs, and contingencies of up to 35% were applied to other project feature costs, resulting in a total project contingency of almost $2.3 billion. Since mitigation costs are generally only 1% to 5% of the total project cost and the total project cost includes substantial contingencies, mitigation uncertainties and potential mitigation cost increases are already reflected in the total project cost estimates.	RPEIS, Section 6.19; Appendix K
USFWS8	GIWW/size change	Because the west GIWW floodgate is the upstream-most structure affecting Atchafalaya River freshwater flow entering the protection system via the GIWW, the now smaller cross-section of this structure potentially invalidates the model-determined hydrologic and salinity impacts of the HNC Lock, the Bayou Grand Caillou floodgate, and the entire Morganza system. Because of this change, it is recommended that the Corps must now assess whether the previous hydrologic modeling is still valid. Additionally, this design change raises the potential that Atchafalaya River freshwater inputs may be reduced in areas currently receiving those seasonal freshwater flows, and this smaller floodgate is more likely to cause elevated stages immediately west of the floodgate – both conditions that could result in marsh loss. It is recommended that these potential impacts will need to be assessed for a feasibility level analysis.	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
USFWS9	Editorial/Clarification	Summary-PAC Report, page x, paragraph 4. The sentence identifying the structures on federally-maintained waterways is not written clearly and can be interpreted such that both the west and east GIWW floodgates will include two 125-ft sector gates. The sentence should be re-written to clarify that each of those floodgates will include only one sector gate.	Sentence was revised to clarify that each of the floodgates will include only one sector gate.	PAC page x

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USFWS10	Editorial/Clarification	Summary-PAC Report, page x, paragraph 5. The statement that the project will result in “improved distribution of freshwater inflows using environmental water control structures for tidal exchange” is potentially misleading. This potential environmental benefit is largely unrealized as modeling demonstrates that future-with project salinities would change little compared to future-without project salinities. However, the two Falgout Canal environmental water control structures are the exception. Those structures will introduce freshwater to areas not currently receiving direct freshwater inputs. Because those structures would be operated to provide one-way flow, they technically would not provide two-way “tidal exchange.” Furthermore, efforts to incorporate freshwater distribution improvements (Congressionally authorized environmental benefits) have not been included within the Morganza project goals but instead are part of the Louisiana Coastal Area (LCA) Convey Atchafalaya River Water to Northern Terrebonne project, and the LCA HNC Lock Multi-purpose Operation project. We, therefore, recommend that this sentence be deleted.	Concur. Sentence deleted as recommended.	PAC page x
USFWS11	Mitigate	Summary-PAC Report, page x, last paragraph. The explanation of mitigation requirements should be amended to explain that the listed requirements cover only the compensation for direct construction impacts and that mitigation for indirect impacts has yet to be determined. This comment also applies to the description of direct impacts in the PAC Report, Section 7.1.	Concur. Additonal information has been added regarding mitigation for indirect impacts.	RPEIS, Section 6.19; Appendix K
USFWS12	Direct & Mitigate	The calculated direct construction impacts are based upon 2008 National Wetland Inventory (NWI) habitat acreages. However, historic loss rates were applied to the NWI marsh acreages to estimate impacted marsh acreage at the construction year for each levee reach. If mitigation for construction of some levee reaches has already been completed, then the listed mitigation requirements provided must be reduced by the value of completed mitigation to obtain an estimate of remaining compensation needed.	Concur. For those levee reaches already constructed and for which mitigation has already been completed, the listed mitigation requirements will be revised to account for the value of completed mitigation so that an estimate of compenstatory mitigation remaining will be more accurately determined. This will be addressed in the supplemental NEPA document covering that action. Note that this issue is not applicable to the constructible features identified in the RPEIS and thus does not affect the proposed mitigation for habitat impacts generated by these constructible features.	RPEIS Section 6.19; Appendix K
USFWS13	Refuge impacts & Permits	PAC Report, Section 5.1.1, page 41, paragraph 1. With the exception of alignment A1, all of the remaining Reach A levee alignment alternatives would impact Mandalay National Wildlife Refuge (NWR). Well in advance of surveying or construction work on the Refuge, a Special Use Permit must be obtained from the Refuge Manager (985-853-1078). All efforts should be made to avoid impacting NWR lands. All impacts to NWR lands must be mitigated on the Refuge. If levees are contructed on the Refuge, the FWS will determine if the impacted acreage will need to be replaced with an equal acreage of habitat.	All efforts to avoid impacting Mandalay NWR lands will be considered. A special use permit will be obtained for any surveying or construction on NWR lands. If levees or other project feautres must be constructed on the Mandalay NWR, the USACE will coordinate with the USFWS to determine the unavoidable habitat impacts, the habitat functions/values that would be lost due to these impacts, and appropriate mitigation to ensure there is no net loss of habitat functions/values. The USACE will strive to compensate for unavoidable impacts via mitigation within the Mandalay NWR boundaries and/or its acquisition boundaries. If this is not practicable, the USACE will strive to provide the necessary mitigation in a different NWR within the same NWR complex.	NA
USFWS14	Editorial/Inconsistency	PAC Report, Section 5.1.1, page 41, last paragraph. The first sentence states that each Reach A levee alignment alternative will include two 125-foot floodgates. This appears to be a reference to the design of the west GIWW floodgate. Elsewhere in the PAC Report and RPEIS the west GIWW floodgate is to include only one 125-foot floodgate. All descriptions of this floodgate should be made consistent.	Concur. All descriptions of west GIWW floodgate have been made consistent throughout the documents.	PAC Section 5.1.1
USFWS15	Editorial/Clarification	PAC Report, Section 6.4.2, page 61, paragraph 3. This paragraph mentions the salinity effects associated with the reduction in west GIWW floodgate cross-section. The paragraph also suggests that the eastern GIWW floodgate cross-section has also been reduced, yet this change was not listed as one of the project changes in the Summary-PAC Report. If the east GIWW floodgate design has been changed, this change should be described in the Executive Summary and this paragraph should be clarified.	Concur. This sentence has been clarified and also described in the Executive Summary.	PAC Secton 6.4.2
USFWS16	Indirect/gate closures	PAC Report, Section 7.4.1, page 79, paragraph 1. The described operation of the HNC lock and the HNC floodgate for salinity control does not give a specific salinity value or other criteria for closing those structures. Hence, closure frequency and duration cannot be determined, nor can indirect impacts of HNC closure. Specific closure criteria will need to be developed before impacts can be determined for this feature.	Concur. Specific closure criteria has been developed in order to determine potential impacts of this feature. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	PAC Section 7.4.1; RPEIS, Summary; Section 3.5.1; Appendix F

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USFWS17	Indirect/gate closures	PAC Report, Section 7.4.1, page 79. The third criteria for re-opening the HNC Complex is a salinity below 13 parts per thousand (ppt) at the Bayou Grand Caillou at Cocodrie gage site. This gage is actually located on Bayou Petit Caillou, and not on Bayou Grand Caillou. Salinity data has not been recently collected at this site, so it is impossible to determine if this criterion is appropriate following tropical storm passage. Salinity data from Coastal Reference Monitoring System (CRMS) Station 434, located near the HNC lock, reveals that for certain storms, salinities may remain high for several days after the storm has passed, depending on rainfall, storm path, and other factors. For example, after Tropical Storm Debby in June 2012, salinity remained above 12 ppt for 5 days after storm passage. Because recent salinity data is not available from the proposed gage site, this gage cannot provide a basis for re-opening the Lock and closure duration therefore cannot be determined.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS18	Indirect/gate closures	The fourth criterion listed for re-opening the HNC Complex is a specific chloride threshold. This criterion should state where those chloride values are to be measured.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS19	Indirect/gate closures	In the concluding paragraph, it is stated that the operation plan is “preliminary and will be refined in the future once the detailed structure design is completed.” The lack of near final structure designs and operation plans indicates that this feature is not yet at a feasibility-design stage and it is not yet possible to conduct a feasibility-level impact assessment. We recommend that the operation plan for this feature be fully developed and associated impacts assessed and disclosed.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F

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USFWS20	Indirect/gate closures	PAC Report, Section 7.4.5, page 81, paragraph 1. The last sentence of this paragraph suggests that the +2.5 ft NAVD88 stage criterion may be adjusted in the future. Because no specific adjustments were proposed, and because the text indicates that adjustments “may need to be” made, the impacts of these unknown adjustments cannot be assessed. Consequently, feasibility-level assessment of closure impacts will have to be based on the fixed criterion of +2.5 ft. If the Corps intends to vary the criterion, then a specific method for varying the criterion should be proposed so that the closure frequency and duration can be predicted and impacts assessed.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. 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USFWS21	Mitigate	PAC Report, Section 7.7.2, page 83, paragraph 1. The first sentence should be revised to indicate that the stated mitigation requirements cover only direct construction impacts and indirect impacts would require additional mitigation.	Concur. This section has been revised to include mitigation requirments for indirect impacts. (same comment as USFWS11)	RPEIS, Section 6.19; Appendix K
USFWS22	Indirect/gate closures	The last sentence of the paragraph states the HET determined that no indirect impact would occur. Actually, the HET chose not to quantify indirect impacts because of uncertainties associated with the lack of needed data to assess indirect impacts. However, changes in the proposed structure operation plans will result in fairly substantial indirect impacts to fisheries access. When needed information is available, the HET will be able to quantify those impacts. Hence, this statement should be revised to state that the HET has determined that indirect impacts will occur and estimates of those impacts will be provided in the final PEIS or other NEPA document.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. 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For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. 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USFWS23	Mitigate/Costs	PAC Report, Section 7.8, page 84, last sentence. Under nearly ideal conditions, the organic surface material could achieve 1175 acres of marsh mitigation. However, oxidation of organics and the loss of fluid soil components, and/or compaction of underlying soils may impact the effective use of this material. Therefore, it would be appropriate to factor in some loss of this material when estimating mitigation costs. Additionally, it should be footnoted that mitigation costs will likely increase when indirect impacts are quantified.	Mitigation cost estimates already accounted for the issue mentioned regarding a certain amount of "loss" of any organic materials/organic soils used, in conjunction with other borrow material, to construct earthen platforms for mitigation features. In addition, development of the updated $10.3 billion cost estimate for the 1% AEP plan included a cost and schedule risk analysis. As part of the risk analysis, high risk cost items were identified including structural and geotechnical uncertainty, steel cost, fuel cost, unidentified borrow pit for hauled in material, and construction modifications. Based on the risk analysis, a contingency of 25% was applied to borrow real estate costs, 26% was applied to the mitigation costs, and contingencies of up to 35% were applied to other project feature costs, resulting in a total project contingency of almost $2.3 billion. Since mitigation costs are generally only 1% to 5% of the total project cost and the total project cost includes substantial contingencies, mitigation uncertainties and potential mitigation cost increases are already reflected in the total project cost estimates.	RPEIS, Section 6.19; Appendix K
USFWS24	Indirect/Enclosed	PAC Report, Section 10.1.6, page 98. This section should be amended to address the fact that existing road dumps and canal spoil banks, in combination with construction of the proposed levees may create small unintentional impoundments that could result in adverse impacts to enclosed wetlands. Such problems exist within the proposed Barrier Reach levees, Reach A levees, the Larose reaches, and other areas. The text should state that such problems will be addressed during the feasibility phase planning of those levee reaches.	Concur. The following statement was added to Section 10.1.6: "Existing road dumps and canal spoil banks, in combination with construction of the proposed levees, may create small unintentional impoundments that could result in adverse impacts to enclosed wetlands. Such problems exist within the proposed Barrier Reach levees, Reach A levees, the Larose reaches, and other areas. Any such problems will be addressed during the PED of those levee reaches and will be documented in a supplemental NEPA document."	RPEIS, Summary; Section 6.18; 6.19; Appendix F and K
USFWS25	Indirect/Sediment	Draft RPEIS, Section 3.7.2, page 3-12, last paragraph. The first sentence states that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence. Consequently, we recommend that the listed causes of marsh loss should also include submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise.	Concur. This section has been revised to include marsh loss due to submergence associated with the combined effects of sediment deprivation, subsidence and sea level rise as well as anthroroginic impacts assicuated with oil drilling, and development.	RPEIS, Summary; Section 6.18; 6.19; Appendix F and K

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USFWS26	Indirect/gate closures, Editorial/Clarification & Editorial/Inconsistency	Draft RPEIS, Section 3.8.2, page 3-13, second paragraph. The first sentence states that the 2002 HNC Complex operation plan has not changed. However, the incomplete operation plan presented in the PAC Report, page 79, and the RPEIS on page 4-22 does differ from the 2002 plan in that the 7.5 ppt salinity closure criteria at the Dulac pontoon bridge is no longer in the current plan. Because the current plan has not yet been fully developed, it is likely that there may be additional differences in the future. This sentence should be revised to state that the goals for operating the HNC Complex have remained unchanged, but that some criteria for operation have changed. Also, the details of the operation plan described in this paragraph differ from those listed in the PAC Report, page 79.	The section will be revised as suggested. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. 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USFWS27	Indirect & Editorial/Clarification	Draft RPEIS, Section 4.4, page 4-25, Table 4-4. The text describing wetland impacts associated with the project alternatives could be more accurately described as follows, "More than 3,000 acres of vegetated wetlands would be lost by construction of project features. These losses would be mitigated through the creation of vegetated wetlands in the project area." The text describing fisheries impacts due to project alternatives indicates that the project would have indirect impacts of "continued loss of coastal habitats supporting fisheries." The use of the word "continued" incorrectly suggests that the pre-existing wetland loss problem is a project effect. Reduced fish access due to increasingly frequent structure closure would be an adverse fisheries impact that is not mentioned, but should be included.	Concur. This section will be revised as suggested. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . 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USFWS28	T&E & Editorial/Clarification	The text describing impacts to threatened and endangered species states that the project would "benefit T&E species dependent on these habitats." Because there are no T&E species using project area habitats, the mitigation of construction impacts within the project area would not directly benefit T&E species. The statement regarding T&E effects should be limited to the following, "No direct impacts on T&E species or their critical habitat."	Concur. This section will be revised as suggested.	RPEIS Section 6.8
USFWS29	Editorial/Clarification	The description of hydrology under no-action consists of two sentences. As written, the second sentence regarding wetland loss might be attributed to the subject of the first sentence (Atchafalaya River freshwater inputs). To avoid that possible misunderstanding, the second sentence should be revised as follows, "Continued wetland loss would result in higher storm surges . . ."	Concur. This section has been revised as suggested.	RPEIS Section 6.11
USFWS30	Eco Proj & GIWW	Because the No Action description mentioned Atchafalaya River freshwater inputs, the with-project alternatives should also address this issue. However, the effects of reducing the size of the west GIWW structure has not yet been modeled, so therefore, there may not be any model outputs available yet to address this issue.	Do not concur. The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
USFWS31	Editorial/Clarification	Draft RPEIS, Section 6.1, page 6-1, last paragraph. The first sentence states that the impact analysis begins when construction is completed. The text should be revised to indicate that the impact analysis began in 2015, when the construction impacts would begin, and that impacts were evaluated over a 70-year period, from 2015 through the end of the project life in 2085.	Concur. This section has been revised as suggested.	RPEIS Section 6.1

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USFWS32	Eco Proj & FWOP	Draft RPEIS, Section 6.2.1, page 6-3, last paragraph. The text states that benefits to wetlands will occur under without-project conditions due to implementation of the two LCA projects. Similar statements are frequently made in later sections as well. This assertion is problematic given that the HNC Multi-purpose Operation Project will be dependent on construction of the Morganza project. Therefore, it cannot occur under the without-project condition. The PAC Report also states in several locations that implementation of these two LCA projects has recently been suspended. Because there is no certainty that these two projects will be constructed, the anticipated effects of these LCA projects should no longer be considered as part of the without-project condition.	Do Not Concur.The project was designed to not interfere with existing and proposed ecosystem restoration projects. Use of the GIWW to divert freshwater is not a component of the Morganza project, but is a component of the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project. The LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project is authorized by Congress and therefore should be considered as part of the future without and future with project conditions. The reason that the State requested that the LCA projects be put on hold was not based on the Morganza to the Gulf project. There was no determination by the State that the project would interfere with the LCA projects. In addition, a project similar to the LCA project is included in the State 2012 Master Plan. Furthermore, funding from the recent Deepwater Horizon oil spill fines will be released to impacted states, including Louisiana, for ecosystem restoration efforts. Hence, the authorized LCA project is a reasonably foreseeable project and should be addressed in both the future without and future with project conditons.	NA
USFWS33	Indirect	Draft RPEIS, Section 6.2.2, page 6-3, first paragraph. This paragraph states that the WVA was used to determine project impacts. Impacts for the constructable features and associated mitigation were determined using the WVA. However, for the remaining features, impacts were assessed in terms of wetland acres impacted. Estimates of indirect impacts of programmatic features are being prepared using the WVA method.	This section was revised accordingly. WVAs have been run for both the direct and indirect impacts that would result from the constructible elements of the project. For the remaining programmatic elements of the project, direct habitat impacts were simply based on acres and the anticipated mitigation requirements were based on a preliminary mitigation ratio. No indirect habitat impacts have been estimated for the programmatic elements. Future supplemental NEPA documents addressing the programmatic elements will include determinations of both direct and indirect habitat impacts and will employ WVA models to determine the necessary mitigation.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS34	Indirect/gate closures	Draft RPEIS, Section 6.2.2, page 6-4, Indirect Impacts paragraph. The first sentence is confusing. The HET did determine that loss of wetlands enclosed within the levee system would remain unchanged. However, the HET was unable to conduct a WVA analysis of wetland enclosure impacts which would include fisheries access impact, because of insufficient data and schedule constraints. The HET, therefore, made a qualitative assessment that fisheries access impacts were likely small. However, that initial assessment was based upon an earlier and less restrictive structure operation plan, and the inability to quantify impacts due to insufficient data. However, it appears that the new more restrictive structure operation plan will result in rather substantial fisheries access impacts and those impacts are currently being determined now that more data is available.	Concur. Additional data has only recently been made available and this section will be revised upon completion of re-analysis of impacts. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS35	Indirect	Draft RPEIS, Section 6.2.3, page 6-5, Indirect Impacts paragraph. The statement is incorrect. The HET was unable to conduct WVA assessments of indirect impacts. However, such assessments are being conducted now and it appears that there will be substantial fisheries access impacts.	Concur. Additional data has only recently been made available and this section will be revised upon completion of re-analysis of impacts. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; Appendix F
USFWS36	Indirect	Draft RPEIS, Section 6.5.2, page 6-11, first paragraph. Where levees are constructed using adjacent borrow, fisheries impacts will also include the conversion of shallow open water habitats to less valuable deep water borrow canals.	Partial Concur. This section has been revised to include deep water habitat, but also describes the potential benefits to fish of deeper water.	RPEIS, Summary; Section 6.5.2; Appendix F
USFWS37	Indirect	Draft RPEIS, Section 6.5.2, page 6-12, Second paragraph. The text references salinity increases illustrated by Figure 6-3. The text should also mention that modeling of this area (the Grand Bayou Unit on the Point au Chene Wildlife Management Area) did not factor in local water management capabilities that would remain unchanged under the with-project condition. Therefore, it is likely that the predicted salinity increase would not occur as management of the Grand Bayou Unit will continue.	Concur. This section has been revised as suggested.	RPEIS, Summary; Section 6.5.2; Appendix F
USFWS38	Indirect	Draft RPEIS, Section 6.5.2, page 6-15, Table 6-3. With-project fish access for the Reach E Falgout Canal structures is stated as being improved. Because those structures are to be operated to create a one-way southward flow of freshwater when freshwater is available, they will provide little improvement in fish access. We recommend that this statement be deleted.	Concur. This section has been modified to explain that there would be slight improment going from North to south.	RPEIS, Summary; Section 6.5.2; Appendix F

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USFWS39	Indirect/gate closures	Draft RPEIS, Section 6.5.2, page 6-17, Indirect Impacts Section. The text incorrectly states that the indirect impacts for constructable features (the HNC lock and floodgate and the Bayou Grand Caillou floodgate) would be the same as for programmatic features. According to the PAC Report pages 79-80, closure of those constructable feature gates are triggered by the approach of named storms, and HNC closures are also triggered by salinity. Programmatic feature closures are triggered by the more frequent +2.5 ft stage criterion, regardless of cause. In the future, sea level rise will result in very frequent non-storm closures of the programmatic feature gates, whereas the constructable features are not closed due to exceedence of the stage criterion during non-storm conditions.	Concur. This section has been revised as suggested.	RPEIS, Summary; Section 6.5.2; Appendix F
USFWS40	EFH	Draft RPEIS, Section 6.6.1, page 6-18, First sentence. This sentence references “increased storm intensity” as contributing to Essential Fish Habitat (EFH) loss. Methods used in this study to estimate future land loss rates did not incorporate changes in storm intensity. Instead it was assumed that historic marsh loss rates would remain constant into the future, except for increased inundation associated with sea level rise. Given that increased storm intensity was not factored into marsh loss estimates, it would be appropriate to delete it as one of the causes of future marsh (EFH) loss.	Concur. This section has been revised as suggested.	RPEIS, Section 6.6.1,
USFWS41	Indirect/gate closures	Draft RPEIS, Section 6.6.2, page 6-19, Indirect Impact of Programmatic Features. The text states that fish access impacts “are expected to be minor.” Given the revised structure operation plans, the frequency and duration of gate closures will increase due to sea level rise and will result in very substantial fish access reductions.	Concur. This section has been revised as suggested.	RPEIS, Summary; Section 6.6.2; Appendix F
USFWS42	Indirect	Draft RPEIS, Section 6.6.2, page 6-19, Indirect Impacts of Constructable Features. The text states that these indirect impacts would be similar to that of the programmatic features. Relative to fish access impacts, this statement is not true. See above comments for page 6-17.	Concur. This section has been revised as suggested.	RPEIS, Summary; Section6.6.2; Appendix F
USFWS43	Mitigate & Indirect	Draft RPEIS, Section 6.7.2, page 6-22, Indirect Impacts of Programmatic Features. The text references “an overall increase in wetland acreage.” Because the HET did not predict any with-project wetland acreage increases, this statement conflicts with the HET analysis. Furthermore, mitigation to offset construction impacts might result in a period of temporal habitat quality losses. Therefore, it is unlikely that an increase in wildlife habitat quantity and quality would occur with-project.	Concur. This section has been revised as suggested.	RPEIS, Section 6.19; Appendix K
USFWS44	Indirect	Draft RPEIS, Section 6.7.2, page 6-22, Cumulative Impacts Section. The text indicates that there will be a cumulative restoration, protection, and enhancement of critical habitat for migratory neotropical songbirds. At best, the Morganza project would result in a no-net loss of such habitat. However, given the historic declines in such habitat due to sea level rise and development pressures, the quality and quantity of this habitat is likely to continue to decrease even within the Morganza system. Other marsh restoration projects are not likely to have a significant positive effect on this habitat type. Therefore, the overall quality and quantity of such habitat is unlikely to be restored, protected, or enhanced. Instead, it will likely continue to decrease as it has in the past.	Concur. This section was revised as suggested. But at a slower rate	RPEIS, Summary; Section 3.5.3; Appendix F
USFWS45	Editorial/Clarification	Draft RPEIS, Section 6.11.1, page 6-26. This section seems to be about local levees and not about hydrology. Hydrology discussions should include information about seasonal Atchafalaya River inputs via the GIWW.	Section was revised to include information about seasonal Atchafalaya River inputs via the GIWW.	Draft RPEIS, Section 6.11.1
USFWS46	GIWW	Draft RPEIS, Section 6.11.2, page 6-28, Plan 3 Direct and Indirect Impacts. McAlpin 2012 (Reference in RPEIS) modeled the west GIWW structure as consisting of one 175-ft-wide sector gate with six 16-ft-wide sluice gates. The design of this structure described in the PAC Report has a total cross-section approximately 18% less than the one modeled. The results of the applicable sensitivity runs to simulate the effects of this reduction in structure cross-section should be presented. Information on structure-induced elevated water levels (magnitude and spatial extent) to the west of this structure should also be provided.	Do not concur. Information on the size of structure and number of sluice gates was corrected in document The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	Draft RPEIS, Section 6.11.2
USFWS47	Editorial/Clarification	Draft RPEIS, Section 6.11.2, page 6-28, Cumulative Impacts. The subject of this section appears to be on protection levees rather than hydrology.	Section was revised to discuss the hydrology.	Draft RPEIS, Section 6.11.2
USFWS48	Editorial/Clarification	Draft RPEIS, Section 6.18.5, page 6-57, Table 6-4. The row describing hydrology effects deals with hydrology only in the “Past Actions” column. The other cells in this row describe levee conditions and not hydrology.	The table row on hydrology effects was revised to pertain to hydrology.	Draft RPEIS, Section 6.18.5, page 6-57, Table 6-4
USFWS49	Indirect/gate closures	Draft RPEIS, Section 6.18.5, page 6-58, Table 6-4. In the row for Fishery Resources, it is incorrectly stated that the Tentatively Selected Plan (TSP) would result in minimal fisheries resource impacts. The current more restrictive structure operation plan would result in substantial fisheries impacts. These adverse TSP effects would require reassessment of cumulative effects, especially when one considers the effects of continuing high rates of wetland loss.	Concur. This table was revised as suggested.	RPEIS, Table 6-4
USFWS50	Editorial/Clarification	Draft RPEIS, Section 6.19.4, page 6-62, second paragraph. The last sentence is confusing and needs to be revised. Although the enclosed wetlands themselves would not experience an indirect impact, fish access impacts would result in with-project impacts as assessed by the WVA. Those impacts will likely require additional mitigation.	Concur. This section was revised as suggestedAdditional mitigation for indirect impacts has been included in the document (see Appendix K)	Draft RPEIS, Section 6.19.4 Appendix K

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USFWS51	Indirect/gate closures	Draft RPEIS, Section 6.19.4, page 6-70, first paragraph. The last sentence states “The HET determined through WVA modeling that the project would result in no indirect impacts to wetlands.” This statement is inaccurate because it refers to an earlier version of the structure operation plan in which the HET chose to not assess indirect impacts using the WVA. The revised structure operation plan provided in the PAC Report (page 79-80) will have more frequent and longer-duration gate closures, and will likely result in substantial indirect impacts. The HET is currently in the process of assessing indirect impacts for the constructable features and for the entire Morganza system, using the WVA.	Concur. This section will be revised as suggested utilizing HET re-analysis results. A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	global changes to EIS.
USFWS52	GIWW	Draft RPEIS, Section 8.3, page 8-2, Table 8-1. The Corps response to FWS comment #1 is that the Corps has verified that the west GIWW floodgates “have no impact on water flowing to the east.” Because this structure is described as “two adjacent floodgates” it appears that the Corp’s evaluation was conducted for the earlier and larger version of this structure. The FWS and the HET were unaware that the design of this structure had been changed to one floodgate, and we have not seen any analysis of the effects of the revised structure. That analysis, comparing changes in without-project discharge and stage, should be included in the PAC Report and RPEIS. Because the design of the west GIWW floodgate could potentially alter the hydrologic effects of the constructable features, the evaluation of the re-designed west GIWW floodgate should be conducted as soon as possible so that impacts of the constructable features can be accurately determined. These comments are also applicable to the Corp’s response to FWS comment #8d.	Information on the size of structure and number of sluice gates will be corrected in document. The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
USFWS53	Eco Proj	Draft RPEIS, Section 8.3, page 8-6, Table 8-1. Via comment # 8e, the FWS requested that the Corps determine the effects of the HNC Lock on the CWPPRA North Lake Boudreaux Basin Freshwater Introduction Project. That analysis has apparently not been conducted and is necessary to truly evaluate effects of these constructable features so that those features would be ready for construction. The results of that analysis should be presented in the RPEIS.	Concur. Effects will be investigated during PED. Any effects will be approapitily mitigated	Draft RPEIS, Section 8.3
USFWS54	Editorial/Clarification	Draft RPEIS, Appendix F. The subsection titled “Methodology for Quantifying Environmental Benefits/Impacts” is presented twice. Following that section is a number of unidentified tables that should be sized to fit on one page rather than multiple pages. The memos following those tables should be deleted because they are provided at the beginning of the appendix.	Concur. This section was revised as suggested. The repeated portion was deleted.	Draft RPEIS, Appendix F
USFWS55	Mitigate	PAC Report, Plate 6 of 14. A continuous mitigation area is shown paralleling Falgout Canal. To allow the two environmental water control structures to function properly, breaks in this continuous mitigation area should be provided at each of those water control structures.	Concur. During the PED phanse the mitigation area will be designed as suggested to account for each of the water control structures and will be included in a supplemental NEPA document.	NA
USFWS56	Mitigate	PAC Report, Plate 7 of 14. The mitigation area paralleling the levee across Sweetwater Pond would potentially impound Sweetwater Pond and might render the Bayou Sale environment water control structure useless. One or more gaps should be provided in that mitigation area to maintain tidal exchange. Similarly, a gap in the mitigation area should be provided at the reach H-1 environmental water control structure.	Concur. During the PED phanse the mitigation area will be designed as suggested to account for each of the water control structures and will be included in a supplemental NEPA document.	NA
USFWS57	Mitigate	PAC Report, Plate 9 of 14. Gaps in the continuous mitigation areas should be provided to maintain the function of planned water control structures and to provide water exchange with the borrow canal.	Concur. During the PED phanse the mitigation area will be designed as suggested to account for each of the water control structures and will be included in a supplemental NEPA document.	NA
USFWS58	Mitigate	PAC Report, Plate 10 of 14. Comment same as for Plate 9. Rather than attempt to locate the mitigation features in large deep canals, alternative locations should be sought where the material could be used more effectively.	Concur. During the PED phanse the mitigation area will be designed to avoid deep areas.	NA
USFWS59	Indirect	Draft RPEIS, Section 6.2. The document describes the expected changes in salinity under each alternative, and discusses wetland losses from construction, but it does not describe the changes in wetland plant communities that would result from the changes in salinity. We suggest that the Final EIS describe these changes, and any other biotic changes that would result from changes in wetland plant communities. The model in Snedden and Steyer (2013) (reference below) provides information relating salinity and plant community zonation. Snedden, G.A., Steyer, G.D. 2013. Predictive occurrence models for coastal wetland plant communities: Delineating hydrologic response surfaces with multinomial logistic regression. Estuarine, Coastal and Shelf Science, http://dx.doi.org/10.1016/j.ecss.2012.12.002 (available on line)	Concur. The section wasnot revised as suggested but the information was added to the risk and uncertanty section.	RPEIS, Summary; Section 3.5.3; Appendix F
NMFS1	Indirect	Contrary to statements and details in the RPEIS, indirect impacts for both the programmatic and constructible features are unknown. NMFS does not concur with the RPEIS statements that: (1) a levee project would benefit estuarine-dependent marine fisheries or EFH, (2) there would be no indirect impacts to enclosed wetlands, or, (3) impacts, whether direct or indirect, are selfmitigating.	Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. Based on Federal agency comments, the Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.3; Appendix F

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NMFS2	Indirect & Mitigate	Neither the indirect impacts nor their offsetting mitigation have yet to be quantified for either the constructible or programmatic features of this project.	Both the direct and indirect impacts that would result from the constructible elements of the project have now been quantified and WVA models have been run for these impacts. The mitigation plan to compensate for these impacts has been revised such that the mitigation fully compensates for these direct and indirect impacts. For the remaining programmatic elements of the project, direct habitat impacts have been quantified but indirect habitat impacts have not. Future supplemental NEPA documents addressing the programmatic elements will include determinations of both direct and indirect habitat impacts and will employ WVA models to determine the necessary mitigation.	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS3	Indirect & Mitigate	To be clear, NMFS does not object to hurricane protection to reduce risks to life or property; however, we do have environmental concerns with the process proposed and described in the RPEIS. The RPEIS provides insufficient information, incomplete impact assessments, and inadequate descriptions of mitigation. Consequently, NMFS requests additional information be included in the Final RPEIS and/or Record ofDecision (ROD). The enclosed comments identify areas of concern and where additional infonnation is necessary.	Comment noted	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS4	Indirect/gate closures	Impacts, including frequency and duration of closure for all water control structures, should be assessed for reasonably foreseeable future actions. Such an analysis should include operation for non-storm closures at +2.5 ft. NAVD88 at low, intermediate, and high sea level rise scenarios.	In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. The revised Operation Plan was included in the Final RPEIS. The potential adverse environmental and socioeconomic impacts of increased structure closure will be assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS before the ROD is signed. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" was removed from the Final RPEIS. (b) The following statement was added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis is being coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" is included in the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure es assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resourcesis more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system are also be compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation will be conducted to develop specific design features, implementation procedures, and operational schemes which will specifically focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, the Final EIS includes a qualitative analysis of indirect and cumulative impacts. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc). EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section was revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis will consider the types and number of floodgates and control structures present in levee design; how structures will be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET will run full WVAs for 4 scenarios to give a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling can be conducted to quantify RSLR impacts. (l) Clarified that operation plans, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; Appendix F
NMFS5	Indirect	Indirect impacts should be determined for constructible and programmatic features through coordination with NMFS and other interested natural resource agencies. System-wide modeling should be conducted on features and structure sizes included in the TSP to complete impact assessments. Modeling results ofthe low sea level rise scenario at the end of the project life should be included in the final RPEIS.	For the PROGRAMMATIC features, the Final EIS includes a qualitative analysis of indirect and cumulative impacts. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc). EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section was revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis will consider the types and number of floodgates and control structures present in levee design; how structures will be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. For the CONSTRUCTIBLE features, the USFWS ran full WVAs for 4 scenarios to give a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085.	RPEIS, Summary; Section 3.5.3; Appendix F
NMFS6	Indirect/gate closures	A clarified operation plan for the HNC lock, floodgates, and environmental water control structures should be developed through coordination with NMFS and other natural resource agencies. Those operation plans should be clarified to show: a. The environmental water control structures along Falgout Canal in Reach E 1 would be operated to discharge fresh water southward only. b. The BG C floodgate would remain open during the HNC lock saltwater closure periods. c. Operation plans for floodgates and water control structures, excluding the Falgout Canal environmental water control structures and the HNC lock, would maximize the open cross sectional area as often and long as possible.	In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was included in the Final RPEIS.	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS7	Mitigate	An adequate mitigation plan for constructible and programmatic features should be developed to offset updated direct and indirect impacts through coordination with NMFS and other interested natural resource agencies. The mitigation should consist of marsh creation in open water on the flood side of the proposed levee. The mitigation should be planned, fully funded, and implemented in a concurrent timely manner such that functional and temporal losses of EFH are offset. Revised mitigation details should be made available for public and agency review and comment prior to issuing the Final RPEIS or signing the ROD. Specific mitigation details we recommend be included in the Final REIS include: a. Final sizing of mitigation b. The specific limits of constructible mitigation features c. Spill boxes should be directed into adjacent deteriorating marsh to the greatest extent practicable. d. Construction staging areas should be located to avoid impacts to wetlands. e. Target fill elevations should be based upon a determination of average healthy marsh in the vicinity of the mitigation project in accordance to biobenchmark surveying methods used for restoration programs. The version of geoid height model used when selecting target elevations should be documented. Target elevations and monitoring elevation data should be presented with the same geoid height model correction.	The mitigation plan proposed for the constructible elements of the project has been revised (see Section 6.19 and Appendix K of the RPEIS). It now accounts for mitigation of both direct and indirect habitat impacts and contains specific limits of mitigation features. These revisions were coordinated with the HET. This revised plan now also addresses your comments "a" through "e". The revised mitigation plan for the constructible elements will be included in the final RPEIS and can be reviewed during the 30-day state and agency review period. Further limited refinements to this mitigation plan will likely occur during the PED phase in close coordination with the HET and other PDT members. More specific mitigation plans for habitat impacts associated with the programmatic project elements will be prepared as part of future supplemental NEPA documents	RPEIS, Section 6.19; Appendix K

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NMFS8	Mitigate	An acceptable gapping/degrading plan for containment dikes constructed for marsh creation mitigation should be included through developmental coordination with NMFS. General design for dike gapping should include: a. If total dike degradation is not feasible, one 25-ft gap (bottom width) every 500 ft. is recommended. Depth of gap is dependent on if it is into open water or adjacent marsh. If into open water, gaps should be to the preproject water depth. If gaps lead into marsh, gap should be to average marsh elevation. b. If scour aprons are included, the bottom should be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring. c. Degraded material should be placed on adjacent remaining dikes and not marsh. d. Field adjustments in spacing and dimension based on developing site conditions should be accomplished through coordination with NMFS.	Engineering design criteria was refined with consideration of your suggestions and coordinated with NMFS and the other resource agencies. This is clearly documented in the FRPEIS (refer to revised Section 6.19 and Appendix K).	RPEIS, Section 6.19; Appendix K
NMFS9	Mitigate	Performance standards, monitoring requirements, long-term management, and the adaptive management plan should be revised to be consistent with those currently under development for the Greater New Orleans Hurricane Surge Damage Risk Reduction System.	Concur. Section 6.19 was revised and a new Section K was added to be more consistent with HSDRRS mitigation standards as regards mitigation for the constructible elements of the project. Detailed mitigation performance standards, monitoring requirements, long-term management activities, and adaptive management plans will be provided in future supplemental NEPA documents prepared for the programmatic elements of the project.	RPEIS, Section 6.19; Appendix K
NMFS10	Mitigate	The USACE should remain responsible for mitigation until the mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria. An acceptable adaptive management plan should be developed through coordination with NMFS and other interested natural resource agencies to cover operation and maintenance of the levees and structures, and mitigation. Sufficient appropriated funds should be set aside to fulfill the plan especially as it relates to mitigation compliance.	In accordance with the project's statutory authority, the proposed mitigation actions will include construction, with the Non-Federal Sponsor (NFS) responsible for operation, maintenance, repair, restoration, and rehabilitation (OMRR&R) of functional portions of work as they are completed. On a cost-shared basis, USACE will monitor completed mitigation to determine whether additional activities (ex. further construction, additional plantings, etc.) are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved specified initial success criteria, monitoring & maintenance will be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet subsequent success criteria, USACE will consult with other agencies and the NFS to determine whether operational/management changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve this success, USACE will instruct the NFS to implement adaptive management measures in accordance with contingency plans and subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.	RPEIS, Section 6.19; Appendix K
NMFS11	EFH	Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Act and NMFS' implementing regulation at 50 CPR 600.920(k), the USACE is required to provide a written response to our EFH conservation recommendations within 30 days of receipt. If the USACE's response is inconsistent with our EFH conservation recommendations, the USACE must provide a substantive discussion justifying the reasons for not implementing the recommendations. If it is not possible to provide a substantive response within 30 days, the USACE should provide an interim response to NMFS, to be followed by the detailed response. The detailed response should be provided in a manner to ensure that it is received by NMFS at least 1 0 days prior to the final approval of the action (i.e., signing of the ROD).	Concur. Consistent with the Magnuson-Stevens Act, the USACE has provided a written response to NMFS EFH conservation recommendations.	RPEIS Section 7; Appendix H
NMFS12	Indirect/gate closures & Socioeconomic	However in response to future sea level rise predications, it is probable structures would have to be closed more frequently and for a longer duration over the project life. As closures increase in frequency and duration, substantial socio-economic and environmental risks would likely result. Such impacts should be disclosed in the Final RPEIS.	The potential adverse environmental and socioeconomic impacts of increased structure closure were assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes).	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS13	Indirect & Mitigate	Operation plans, direct and indirect impact assessments, and mitigation are primary natural resource topics of concern with the RPEIS. NMFS believes resolution of issues associated with these matters is necessary to complete an acceptable environmental impact statement and to develop an appropriate mitigation plan.	The potential project-induced environmental consequences to significant resources will be more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. A revised "Operation Plan" will be included in the Final RPEIS.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
NMFS14	Indirect/gate closures	Clarity of the operation plan for the Tentatively Selected Plan (TSP) is lacking and impact assessments are incomplete. Information necessary to complete impact analyses have not been provided. Enclosure 2 is a list of inforn1ation needs to help complete an impact assessment. Items listed in Enclosure 2 have been identified by the draft Fish and Wildlife Coordination Act Report (CAR) and through electronic mail correspondence from the Habitat Evaluation Team (HET) with staff of the USACE.	The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. A revised "Operation Plan" was included in the Final RPEIS and includes clarification that operation plans, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results. The recommendations in the CAR was considered and addressed in the Final RPEIS.	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS15	Indirect/gate closures	The operation plan for the project is unclear. The Post-Authorization Change (PAC) Report and RPEIS both are internally inconsistent to determine if the structures would be operated under storm conditions to protect from storm flooding only, or also under non-storm conditions to protect from tidal flooding. The frequency and duration of structure closures in the future and the associated impacts to the environment would change drastically, if the system was operated to reduce non-storm related flooding. No discussion of likely impacts related to non-storm closures is included in the RPEIS. However given predictions of sea level rise, NMFS believes it is reasonably foreseeable that the structures would be operated in the future under non-storm conditions to protect from tidal flooding.	A revised "Operation Plan" was included in the Final RPEIS and includes clarifications that operation plans, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
NMFS16	Indirect/gate closures & Socioeconomic	Therefore, NMFS recommends the Final RPEIS include an assessment of likely impacts of sea level rise on the frequency and duration of water control structure closures under storm and non-storm operations and include environmental impacts from these reasonably foreseeable actions. Assessments based on increasing amount and length of structure closures should also include socio-economic impacts to communities within the proposed levee system which have cultural and economic dependency on water-dependent commerce.	Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling can be conducted to quantify RSLR impacts.	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS17	GIWW	Accordingly, the system-wide hydrology and hydraulic modeling conducted to assess environmental impacts and assist in project design was run with the 175-ft wide sector gates. Therefore, the accuracy and usefulness of presently available modeling to assess impacts from the TSP is questionable.	Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities.	NA

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NMFS18	GIWW	A smaller GIWW sector gate west of Houma may influence flows and associated freshwater distribution west of, and within, the levee system and may elevate salinities inside and south of the levee system. In order to assess the environmental impacts of the TSP, the model should be rerun with the 125-ft wide sector gates in both GIWW locations as included in the TSP. The updated impact analysis should be coordinated with the HET and included in the Final RPEIS	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities.	NA
NMFS19	GIWW	Figures throughout the RPEIS depicting salinity projections for the TSP should be updated in the Final RPEIS accordingly.	Do Not Concur. The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
NMFS20	GIWW	Alternatively, the number of sluice gates in both GIWW structures could be increased in the TSP to ensure flows are not impacted and presently available modeling results are applicable.	Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates.	NA
NMFS21	Indirect/Enclosed	NMFS does not concur enclosing wetlands behind levees would benefit marsh or estuarine dependent marine fishery resources.	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS22	Indirect	Impact analyses and associated conclusions in the RPEIS are represented as if they are final, while the analyses are actually preliminary and subject to change based on pending modeling results.	Clarified that operation plans, impact analyses, and associated conclusions in the FRPEIS have been updated based on recent WVA model runs for the indirect impact of constructible features. The impacts for the programmatic features are preliminary and will be update in future NEPA documents.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
NMFS23	GIWW	Furthermore, the sizes of the GIWW sector gates in the TSP were reduced after the modeling. Therefore, the presently available modeling is not of the actual TSP. System-wide modeling should be conducted with the TSP-sized GIWW sector gates and consider non-storm closures in the future with sea level rise.	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities.	NA
NMFS24	Indirect	Indirect and cumulative impacts to wetlands, fisheries, and EFH likely would result from potential degradation of water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine dependent fishery species' access to nursery and foraging habitat.	The document was update to reflect these changes.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS25	Indirect & Mitigate	Indirect and cumulative impacts to wetlands, fisheries, and EFH, as well as the mitigation necessary to offset such impacts should be discussed in the Final RPEIS prior to signature of the ROD	The document was update to reflect these changes.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
NMFS26	Indirect	Conclusions of: (1) benefits to marsh and estuarine dependent fisheries, (2) the project being self-mitigating, or, (3) lack of impacts to hydrology from enclosure within a levee system should be removed where stated throughout the document (e.g., PAC Report Table 4-1, RPEIS Sections 6.5.2 Indirect, 6.16.12 Indirect Impacts, and Appendix C). Those sections of the RPEIS should be revised based upon pending indirect impact assessments once necessary data are made available by the USACE.	The statements in the Draft RPEIS that there are "no indirect impacts" was removed from the Final RPEIS. The following statement was added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." The refined impacts analysis has been coordinated with the interagency Habitat Evaluation Team (HET) and the document has incorporated the results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS27	Mitigate	The mitigation plan proposed for constructible and programmatic features is unacceptable as drafted in the RPEIS. NMFS believes the amount of mitigation is indeterminable at this time because impact assessments are incomplete. Sidecast disposal of overburden material on existing marsh should not be considered as mitigation. In addition, the mitigation plan is incompletely developed for the identified constructible features.	Please refer to the responses to NMFS2 and NMFS9 comments. In addition, the disposal of overburden material on existing marsh habitats is not proposed as mitigation.	RPEIS, Section 6.19; Appendix K
NMFS28	Mitigate	Section 6.19 and maps in Appendix G ofthe RPEIS indicate mitigation construction for constructible features would consist of filling existing wetlands and open water from near continuous sidecast disposal of organic overburden unsuitable for the levee foundation. Fill placement impacting existing marsh is unacceptable as mitigation. The locations and amount of fill placement in open water to create marsh as mitigation exclusively for the constructible features is not specified or substantiated with a functional based analysis. The only mitigation analyses conducted by the HET to determine the amount of mitigation necessary, evaluated marsh creation in open water constructed by hydraulic dredging. Because this included no fill on existing marsh, development of wetland functions were projected accordingly. Therefore, the only results available thus far did not evaluate the USACE's currently proposed mitigation and no analyses have been undertaken to quantify performance over the life ofthe project.	The proposed mitigation plan for the contructible elements of the project, including the locations of proposed marsh restoration features, has been revised (see Section 6.19 and Appedix K). This plan proposes marsh restoration features constructed in existing open water areas. The maps in Appendix G have not been revised. These maps do indicate potential mitigation areas but such areas are all related to the mitigation required to compensate for habitat impacts resulting from construction of programmatic elements of the proposed project. While the mitigation areas identified in these maps do overlap existing wetlands (marshes), this overlap was not intended. Mitigation would not occur in existing wetlands, with the possible exception of wetland enhancement activities (ex. enhancement of existing forested wetlands, marsh nourishment but not fill in existing marshes to restore marsh habitat) and limited work necessary to access and construct mitigation features. Accurate mitigation plans for the programmatic elements of the project will be provided in future supplemental NEPA documents.	RPEIS, Section 6.19; Appendix K
NMFS29	Mitigate	NMFS recommends marsh creation be conducted in open water areas only and the siting and sizing of the mitigation areas be coordinated with the HET and substantiated with a functional based analysis.	Concur. The primary intent is to construct the mitigation where possible on the flood side. The intent is to us the overburden from the borrow canals to create marsh in open water areas without impacting existing marsh.	RPEIS, Section 6.19; Appendix K
NMFS30	Indirect/gate closures & Mitigate	The quantification of mitigation necessary to offset indirect impacts is contingent upon the reasonably foreseeable non-storm operation plan and modeling of the frequency and duration of closures.	In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" is included in the Final RPEIS. The potential adverse environmental and socioeconomic impacts of increased structure closure were assessed in greater detail.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS31	Mitigate	Signature of the ROD should be held in abeyance until issues related to mitigation for both direct and indirect impacts are resolved, in particular for the constructible features, through coordination with NMFS.	Concur	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
NMFS32	Mitigate	NMFS finds the "12 items" required by the 2008 mitigation regulations are insufficient as included in the RPEIS.	Please refer to the response to the NMFS9 comment.	RPEIS, Section 6.19; Appendix K
NMFS33	Mitigate	The mitigation plan in Section 6.19 and cost details related to financial assurances in Appendix G need updating based on revised mitigation design, sizing, siting, and performance and monitoring provisions.	Please refer to the response to the NMFS9 comment regarding revisions to the mitigation plan for constructible elements. Appendix G is the "mapbook" and does not contain cost details concerning mitigation. Refer to response to NMFS10 comment for information related to financial assurances and refer to response to USFWS7 comment regarding mitigation costs.	RPEIS, Section 6.19; Appendix K
NMFS34	EFH	Based on our review of the RPEIS, we have determined that although the document contains the four items required of an EFH assessment, the details in those items are insufficient. An EFH assessment includes an analysis of effects, including mitigation, to determine the net and cumulative impact to EFH.	Concur. The EFH assessment and documentation was revised for the FRPEIS to be consistent with suggestions.	RPEIS Section 6.6
NMFS35	Indirect/gate closures & Mitigate	NMFS finds TSP impacts have not been quantified at this time. Therefore, the amount of compensatory mitigation is unknown and the net effects on EFH are undeterminable. However, we acknowledge project effects on EFH could be offset, if impacts are adequately quantified and a sufficient acreage oftidally influenced marsh is created in open water. Such cannot be accomplished until indirect impacts are determined for reasonably foreseeable operation including non-storm closures.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS36	CAR	NMFS provided comments on the draft CAR on January 8, 2013. Those comments should be addressed and resolved through coordination with NMFS prior to proceeding to the final RPEIS. When corrected impact analyses are available, a final CAR should be prepared. Recommendations in the final CAR should be resolved in the Final RPEIS.	Concur. The USACE coordinated with the NMFS and USFWS to address and resolve NMFS comments on the January 8, 2013 draft CAR as well as NMFS present comments. The FRPEIS includes updated coordinated resolutions to NMFS recommendations. The USACE worked with the USFWS to include changes into the revised CAR.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; 7; Appendix F, H and K
NMFS37	Indirect/gate closures	Triggers for closing structures are unclear. Although the USACE's intent may be to close structures only under storm conditions (whether named or un-named storms), departure from the present level of protection and operation would be a significant change for the non-Federal sponsor. This section should be revised to disclose that water control structure operation over the project life is an unresolved issue.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS38	EFH	Table 1-1. The Magnuson-Stevens Act should be added under the Federal Statutes section.	Table 1-1 Updated	RPEIS Table 1-1
NMFS39	Eco Proj	Section 3.11. 3 Coastal Wetlands Planning, Protection and Restoration Act The North Lake Boudreaux Project (TE-32a) should be added to the list of CWPPRA projects in the study area. The project is sponsored by the U.S. Fish and Wildlife Service.	Concur with suggested revision.	RPEIS Section 3.11.3

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NMFS40	Indirect/gate closures	Section 4. 3. 8 Operation of Structures The draft RPEIS and PAC Report are inconsistent regarding operation plans for the floodgates and environmental water control structures. Therefore, NMFS recommends the documents be revised throughout to include the potential for non-storm operation and to evaluate likely impacts of such actions on resources of concern.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS41	Indirect/gate closures	Section 4.3.8.1 Operation of the HNC Lock Complex Data are needed to complete impact assessments. The closure trigger is identified as, "If a gage on the outside of the HNC Lock exceeds a salinity value that has been correlated with preventing exceedance of the maximum allowable chloride level. .. "; however, it does not identify the specific salinity trigger, thereby leaving impacts indeterminable until specified. Opening is identified as occurring once salinity falls below 13 parts per thousand at Cocodrie. There are limited to no salinity data presently available from the Cocodrie gage to determine the likely frequency of closure of the lock based on salinity triggers. The USACE should provide the exact closure and opening triggers, the locations where they are measured, and sufficient salinity data on which to base impact projections. For post construction operations and monitoring purposes, a salinity gage should be established on the flood side of the HNC.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. 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The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS42	Mitigate	Section 4.3.9 Mitigation To compensate for impacts to marsh, NMFS prefers marsh creation (i.e., fill placement in open water) on the flood side of the proposed levee. The map details in Appendix G are generic concepts. The design, location, and amount of mitigation have not been coordinated with the interagency HET and are in need of substantial revision both for programmatic and constructible features, as well as to offset direct and indirect impacts. Marsh creation in open water should be the primary focus and filling existing marsh should be avoided.	Please refer to the responses to NMFS7, NMFS9, and NMFS29 comments.	RPEIS, Section 6.19; Appendix K
NMFS43	Mitigate	Also, the layout of the mitigation should be revised to avoid altering hydrology and impeding flow from environmental water control structures under Falgout Canal Road in Reach E-1.	Concur. During the PED phase the mitigation area will be designed as suggested to account for each of the water control structures and will be included in a supplemental NEPA document.	RPEIS, Section 6.19; Appendix K
NMFS44	Indirect & Mitigate	A thorough analysis of direct and indirect impacts of the constructible features should be completed and this section of the Final RPEIS should be revised by including corrected plates identifying the specific limits for the mitigation work.	Please refer to the responses to NMFS2 and NMFS7 comments. As mentioned, the drawings in Appendix G will be modified in future supplemental NEPA documents to depict specific limits of mitigation features proposed as compensation for the programmatic elements of the project.	RPEIS, Section 3.5.2; 3.5.3; 6.19; Appendix K
NMFS45	Mitigate	Construction access corridors, staging areas, and borrow areas to supplement any shortfalls from sidecast disposal of organic overburden should be identified and discussed. Any dedicated dredging borrow sites to create marsh should be sited and designed to avoid inducing erosion (e.g., wave or slope-failure) of existing marsh bank lines.	Delineation of construction access corridors, additional borrow areas, and staging areas (if needed) necessary to build the marsh creation features proposed as compensation for impacts resulting from the constructible project elements will be accomplished during the PED phase in coordination with the HET and other PDT members. Borrow material in addition to use of organic overburden will definitely be required to construct these marsh features. Borrow sites will be located in keeping with your recommendation. Construction access corridors, staging areas, and borrow areas necessary to construct mitigation features needed for the programmatic project elements will be identified and discussed in future supplemental NEPA documents covering the programmatic elements.	RPEIS, Section 6.19; Appendix K
NMFS46	Borrow	If borrow is expected from bayous, the borrow sites should be segmented with undredged reaches to serve as under water plugs to minimize saltwater intrusion. The borrow areas should be designed to minimize adverse impacts to water quality to the extent practicable. The implications of borrow sites on water quality should be discussed. The USACE is encouraged to include dissolved oxygen monitoring to assess if impacts occur and to identify the potential need to alter borrow designs in the future. These matters should be resolved and discussed in the Final RPEIS and ROD.	Concur: Theses borrow site recommendations will be examined during PED, coordinated with the HET and resource agencies before being clearly documented in the furure NEPA Documents.	NA

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NMFS47	Indirect	Section 4. 4 Comparison of Environmental Consequences of Alternatives Table 4-4. For the one percent and three percent alternatives, wetland impacts in the table should be revised from "displaced" to "destroyed". Impacts to aquatic habitat, fisheries, and EFH should be revised to include indirect impacts from increasing closures of floodgates and water control structures. The Hydrology section should be augmented to indicate localized increases in flooding and salinity are expected on the protected and flood side ofthe levees and to provide a description of where that is projected to occur.	Table 4-4 has been updated the wording displaced has been removed and more detail has been added.	RPEIS, Summary; Section 3.5.2
NMFS48	Indirect	Section 5.2.4 Fisheries This section should be expanded to include a description of the existing marsh management projects, their operation, and limitations structural marsh management have on estuarinedependent fishery species. This information previously was provided to staff of the US ACE for consideration in the system-wide modeling and is available again, upon request.	This information will be add to the Supplemental NEPA document for this levee reach.	RPEIS Sectoin 5.2.4
NMFS49	EFH	Section 5.2.5 Essential Fish Habitat Gulf stone crab and gray snapper should be removed from the discussion and Table 5-7.	Section 5.2.5 information updated	RPEIS Section 5.2.5
NMFS50	Indirect	Section 6.1 Environmental Consequences Introduction and Appendix F. These sections should be expanded to make clear the period of analysis captures temporal losses of wetland function from the time impacts occur from levee construction until functional mitigation is achieved. The starting and ending points of the period of analysis by levee reach and mitigation would illustrate how temporal losses are considered. In addition, the USACE should clarify if the end year to calculate the amount of sea level rise included in the systemwide modeling was 2085 and included years 2004 to 2015. This section acknowledges constructed CWPPRA projects are within the project area, but does not describe how they are handled in the impact assessment or Appendix F on the Wetland Value Assessment analysis. This section should be revised to discuss potential impacts to CWPPRA constructed restoration projects.	The document was update through out to explain the impact begin in 2015 with the start of construction, that the system will have it base elevation by 2035 and the period of analysis will end	RPEIS, Section 6.19; Appendix K
NMFS51	Direct	Section 6.2.2 1% AEP Alternative Direct Impacts A table and discussion should be added disclosing a breakdown of wetland impacts by habitat type.	Concur with suggested revisions.	RPEIS Secton 6.2.2
NMFS52	BMPs	Section 6. 5.1. 2 1% AEP Alternative This section indicates direct impacts would be minimized with the use of Best Management Practices (BMP); however, no description or reference to the BMPs are provided. The document should be revised to include BMPs or to indicate supplemental National Environmental Policy Act documents will disclose BMPs.	Concur with suggested revisions.	RPEIS Section 6.5.1
NMFS53	Indirect/gate closures	Section 6.5 Fisheries The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control structure closures on estuarine-dependent fishery resources.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS54	Indirect	Table 6.3 The information pertaining to Reach F should be revised. Specifically, the HNC Lock is projected to be closed frequently due to salinity and storm provisions, which would limit fisheries access north of the lock to Bayou Grand Caillou. Further, the levee alignment eliminates access from the HNC into the Bayou Platte drainage area from its drainage point south near Deep Bayou. Fisheries access with Reach Kin place would not be improved over existing conditions because water control structures already allow fisheries access into the marsh management units on the Point aux Chenes Wildlife Management Area.	Concur with suggested revisions.	RPEIS, Section 6.19; Appendix K

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NMFS55	Indirect, EFH, & BMPs	Section 6. 6 EFH. NMFS does not concur with the impact assessments to EFH. Indirect and cumulative impacts are incomplete at this time. Impacts presented were based on preliminary and in progress assessments. Indirect and cumulative impacts to EFH should be assessed and described in the Final RPEIS based on revised system-wide modeling for the TSP and include foreseeable nonstorm structure closures. The amounts of flooding and salinity changes have not been substantiated at this time and cannot be concluded as minimal. BMPs are not defined. The EFH section should include acres of open water impacted. Revised analysis should assess potential impacts to water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine fisheries access with increases in structure closures in the future.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . 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(g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Section 6.6; 6.19; Appendix K
NMFS56	Indirect/gate closures & Socioeconomic	Section 6.14 Socioeconomics The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control structure closures on navigation to ports and marinas enclosed within the project area. In addition, this section should evaluate how storm water drainage will be accomplished in the future with various sea level rise projections.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Section 6.6;6.14; Appendix K
NMFS57	Mitigate	Section 6.19 Mitigation NMFS finds the mitigation plan is unacceptable for constructible features and for programmatic considerations for reasons discussed both above and below.	Acknowledged. Please refer to the responses to NMFS2 and NMFS7 comments.	RPEIS, Section 6.19; Appendix K
NMFS58	Mitigate	Section 6.19.4 Wetland Mitigation Plan for Constructible Features The method to convert from impact Average Annual Habitat Units (AAHUs) to mitigation acres is not disclosed and has not been coordinated with the HET. The acreage of necessary mitigation can be determined based upon the mitigation potential (AAHUs/acre) by type of mitigation project. The mitigation potential provides an initial scaling that must be refined based upon a final WVA conducted on Preliminary Engineering and Design (PED) level information for the mitigation. PED level information for the constructible feature mitigation has not been disclosed and therefore final scaling to ensure a one to one functional replacement is not possible at this time.	Do not Concur: The mitigation potential (AAHUs/acre) for open water marsh creation on the flood side of the constructible features was coordinated with the HET by USFWS.	RPEIS, Section 6.19; Appendix K
NMFS59	Mitigate	Table 6-5 This table presents the 12 components of the compensatory mitigation plan. Some of those items are incomplete and/or unacceptable.	Acknowledge. Please refer to the response to NMFS9 comment. Note that the added Appendix K no longer employs a tabular format for components of the mitigation plan.	RPEIS, Section 6.19; Appendix K
NMFS60	Mitigate	Site selection for marsh creation in many reaches overlaps existing marsh, which itself could require separate mitigation actions. NMFS is concerned the layout of the mitigation sites may be presently determined based on the need for sidecast disposal of overburden and not the best layout to compensate for lost ecological services. In addition, the USACE has not conducted an analysis of how such a use of overburden will perform over the life of the project. For the final RPEIS, the site plan should be revised substantially by relocating all overburden disposal and marsh creation to open water areas only, and to include an analysis oflikely performance over the life of the project.	As mentioned, the mitigation plan for the constructible elements of the project has been revised such that marsh creation areas no longer overlap existing marsh habitats. The mitigation plan for the programmatic elements of the project will be revised in future supplemental NEPA documents and will seek to avoid mitigation impacts to existing marsh habitats to the extent practicable. WVA models generated for the constructible mitigation predict the long-term performance of the proposed mitigation features. However, further engineering/geotechnical analyses of these proposed mitigation features will occur in the PED phase to specifically examine how the use of organic overburden materials as partial fill for these features may affect the long-term mitigation objectives.	RPEIS, Section 6.19; Appendix K
NMFS61	Mitigate	The mitigation work plan should be resolved through coordination with the natural resource agencies to resize the mitigation sites after they have been relocated to open water to ensure adequate compensation is provided.	Concur. Please refer to the responses to NMFS2, NMFS7, and NMFS9 comments. Further refinements to the revised mitigation features for the constructible elements of the project will likely occur during the PED phase and would be coordinated with the HET and other PDT members.	RPEIS, Section 6.19; Appendix K

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NMFS62	Mitigate & HSDDRS	Table 6-5. Draft marsh creation work plans developed for the Greater New Orleans Hurricane Surge Damage Risk Reduction System (HSDRRS) should be used for the Morganza to the Gulf Project. Greater specificity and clarity commensurate with constructible features are provided in the HSDRRS performance, success, and monitoring/reporting criteria. Because it was only developed for fresh, intermediate, and brackish marsh, the HSDRRS mitigation work plan should be expanded to address needs for salt marsh mitigation associated with the Morganza to the Gulf Project. In addition, perfonnance standards, monitoring requirements, long-term management plan, and adaptive management provisions should be revised to be consistent with the most current standards developed for HSDRRS.	Concur. The mitigation plan (including work plan, success criteria, monitoring plan, etc.) for constructible project elements has been revised to be similar to marsh mitigation plans developed for HSDRRS.	RPEIS, Section 6.19; Appendix K
NMFS63	Mitigate	Table 6-5. Section 6 of this table discusses access corridors, construction staging areas, and target elevations. Regarding target elevations, this section recommends use of geotechnical analyses and elevations surveys to determine appropriate target elevation ranges. No specific plans have been disclosed for the constructible features mitigation. Settlement curves and survey data have not been provided to substantiate the mitigation plan for the constructible features. Detailed plats identifying the limits of the constructible feature mitigation including access corridors and staging areas have not been disclosed. The vegetation section is unclear as to whether marsh vegetation would be planted. If plantings are proposed, then clarification is needed on what species would be planted and when planting would occur under the proposed plan.	Comments noted. The mitigation plan/mitigation program for the constructible project elements has been revised in an attempt to rectify many of these comments. More comprehensive and detailed engineering design will take place during the PED phase (ex. geotechnical investigations, development of settlement curves, collection of survey data, etc.).	RPEIS, Section 6.19; Appendix K
NMFS64	Mitigate	Table 6-5. Section 8 of this table discusses performance standards. Inclusion of a gapping plan is noted and appreciated. However, we request the spacing and gap dimensions in the plan be revised to increase potential tidal function. Also, a provision should be included for field adjustments in spacing for site conditions.	Concur. The proposed mitigation plan has been revised accordingly. Note that the plan now calls for mechancal degradation of earthen retention dikes to alleviate the need for "gapping" where practicable without causing adverse impacts. However, the plan also allows for the possibility of there being armored or rock dikes that may need to incorporate gaps/fish dips and provides for field adjustments in their speacing. Such design elements will be addressed in the PED phase, if necessary.	RPEIS, Section 6.19; Appendix K
NMFS65	Mitigate	Table 6-5. The final RPEIS should be revised throughout to indicate gapping/degrading would occur manually rather than dependent on sufficient erosion and settlement of dikes over time.	Concur. Refer to response to NMFS64 comment	RPEIS, Section 6.19; Appendix K
NMFS66	Mitigate	Table 6-5. The basis for the proposed target (initial and settled) fill elevation for the marsh creation site is not provided. Target elevations should be based upon a determination of average healthy marsh in the vicinity of proposed mitigation sites. It is recommended those elevations be determined by surveys in accordance to bio-benchmark survey protocols used for marsh creation designs under restoration programs. That methodology includes: Average marsh elevation (NAVD88) should be determined from no less than three locations in the vicinity of a mitigation project. The marsh surface is reached when the survey rod is resting among living stems or is supported by soil containing living roots. In order to get a consistent reading, it may be necessary to cut vegetation stems where stem density is extremely high. A minimum of 20 elevations (each separated by 20 to 40 ft.) at each of the sites should be required for this determination.	Concur. The mitigation section has been revised to include this guidance. Please note, however, that the proposed target elevations for the marsh creation/restoration features proposed as mitigation for the constructible project elements are preliminary at this stage. Refined target elevations will be developed during the PED phase based on the guidance you provided.	RPEIS, Section 6.19; Appendix K
NMFS67	Mitigate	Table 6-5. Elevations measured during the design surveys and all monitoring should indicate the geoid height model used and be corrected to the same geoid if it differs during the monitoring period to ensure like comparisons.	concur: Information was added to the mitigation section.	RPEIS, Section 6.19; Appendix K
NMFS68	Mitigate	Table 6.5. The proposed duration of the construction phase is unclear. The US ACE should remain responsible for marsh mitigation until such mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria.	The mitigation section (Section 6.19 & Appendix K) has been revised in an effort to clarify the duration of construction phase for mitigation slated as compensation for constructible project elements and to help clarify responsibilities. Also, please refer to the response to NMFS10 comment regarding general USACE and Non-Federal Sponsor responsibilities pertaining to mitigation.	RPEIS, Section 6.19; Appendix K
NMFS69	Mitigate	Table 6-5. Section 11 of this table discusses an Adaptive Management Plan. This section specifies corrective actions if openings do not develop in a "continuous breakwater." A "continuous breakwater" is not a component of the project and that statement should be deleted from the text. In addition, this section should be revised to include gapping of marsh creation containment dikes.	The mitigation plan for the constructible project elements has been revised (see Appendix K). Proposed marsh restoration features do not include any breakwaters, rock dikes, or armored dikes at this stage. All earthen retention dikes (containment dikes) will be manually degraded to equal the final target marsh elevations where practicable. However, should complete degradation of one or more containment dikes be impractical, then NFMS "gapping" guidelines would be followed and the plan for gapping would be coordinated with NFMS and other HET members.	RPEIS, Section 6.19; Appendix K
NMFS70	Mitigate	Table 6-5. Section 12 of this table discusses financial assurances and describes responsible parties, but not the amount of financial assurances. The amount should be developed based on the acreage of mitigation, operations, and monitoring to ensure sufficient funds are programmed to accomplish the mitigation. Furthermore, funds (contingency or otherwise) should be included to ensure completion of the Adaptive Management Plan.	Applicable guidance for mitigation plans do not require specification of the amount of financial assurances. The Project Partnership Agreement between the Non-Federal Sponsor (NFS) and the Federal Government provides the required financial assurance for the proposed mitigation. In the event that the NFS fails to perform, the USACE has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature, including mitigation features, but such action would not relieve NFS of its responsibility to meet its obligations and would not preclude the USACE from pursuing any remedy at law or equity to ensure the NFS's performance.	RPEIS, Section 6.19; Appendix K
NMFS71	Mitigate	Appendix F The dollar amounts listed relate to the amount of funds necessary for financial assurance to complete mitigation. It is unclear if the dollar amounts for monitoring are estimated based upon the scope of details in Table 6-5. Dollar amounts included for mitigation construction and monitoring should be revised based on necessary revisions to the mitigation plan consistent with HSDRRS.	The dollar amount is based on numbers generated from the HSDRRS program and is appropriate for the programatic features. Detailed cost estimates for the constructable feature has been added.	RPEIS, Section 6.19; Appendix K

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NMFS72	Indirect/gate closures	ENCLOSURE2 NOAA's National Marine Fisheries Service (NMFS) Comments on the Draft Revised Programmatic Environmental Impact Statement (RPEIS) entitled "Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana"- Preliminary List of Pending Information Needed to Complete Impact Analyses 1. Operation Plan a. Operation for non-storms b. Verification of the elevation trigger for closures c. Determine the frequency and duration of structures closures both under storm and non-storms conditions at +2.5 ft. NAVD88 in the future under the low, intermediate, and high sea level rise scenario; reconcile differences projected by the USACE and the U.S. Fish and Wildlife Service d. HNC Lock salinity closure criteria should be established e. HNC Lock opening criteria needs to be defined for a location outside of the lock f. Determine when structures on the southeast side of the project area would be closed more frequently g. Operation for water control structures in the constructible features should be provided	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
NMFS73	Indirect/gate closures	Enclosure2. 2. Data Needs a. Determination by the USACE if the system-wide model results based on 175-ft wide sector gates in the GIWW remain valid for the TSP that has 125-ft wide gates b. System-wide model runs for the TSP (i.e., 125-ft sector gates in the GIWW structures) c. Stage data needed for locations other than HNC at Dulac d. Need salinity data under low sea level rise at the end ofthe project life (e.g., system-wide modeling ofFuture Without Project, Planl, and Plan3, under low SLR scenario at the end of the project life) e. Tidal exchange flux or equivalent from system-wide model (re: WVA Variable 6, Average Tidal Flux method) f. Salinity data for HNC opening criteria to assess if data are available to base 1) a 13 ppt opening criteria and 2) measured at Bayou Petite Caillou at Cocodrie is feasible	Concur: Information on the correct size of GIWW flood gates, the number of associated sluice gates and volume of water they can pass are included in the PAC and EIS	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
NMFS74	Indirect/gate closures	Enclosure 2. 3. Impact Analyses a. Updated indirect impacts based upon non-storm operation in the future under the three sea level rise scenarios b. Updated indirect impacts based upon 125-ft sector gates in the GIWW structures and revise all indirect and cumulative impacts. c. Assess the frequency of the +2.5 ft. NAVD88 threshold on theSE side of the project area. d. Updated impacts based on the HNC lock operation for the closure and opening criteria e. AdH without-project baseline salinities are low consider TABS baseline salinities f. Complete revisions for fish access, Variable 6 1. Resolve Method(s) selection n. Assigning values under selected method(s) iii. FWOP values for existing marsh management structures	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
CPRA1	Buyout	PAC 1. Page vii: Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	PAC page vii

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CPRA2	WIK	PAC 2. Interim protection measure in advance of the PPA should be factored as a creditable features that will serve until such time as these are incorporated into the Federal System.	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	PAC
CPRA3	Buyout	PAC 3. Page 64, Section 6.5.1 Impacts on Structures Outside of the Risk Reduction System: Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	PAC Section 6.5.1
CPRA4	Indirect/gate closures	PAC/EIS 4. PAC Report and PEIS should remove references to closures to +2.5 Feet NAVD88 and instead closure criteria should be defined based upon prevention of flooding and protection of life and property.	After this comment was made, USACE, non-Federal sponsors (including commenter), and Habitat Evaluation Team agreed on closure assumptions for purpose of determining indirect impacts for the constructible features. Some gates still have a stage closure trigger.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
CPRA5	HSDRRS/Site adapt	PAC 5. Report does not indicate alternative measures to reduce cost that may or may not deviate from the current HSDRRS standards based upon the unique characteristics of the project area while still maintaining the appropriate measures of risk reduction and levee certification.	Potential opportunities to site-adapt the HSDRRS standards has been added to the Final PAC report. The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	NA
CPRA6	HSDRRS/Site adapt	PAC 6. Unlike the levee system in the Greater New Orleans Area with its current allowable overtopping rate, the Morganza project contains a large retention basin that could allow for additional storage capacity. As such, the project should ensure optimization of overtopping rates which would allow decreased heights for levees and structures and thereby reducing project costs.	Potential opportunities to site-adapt the HSDRRS standards, including overtopping rates, has been added to the Final PAC report. The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	PAC
CPRA7	Economic analysis/BCR	PAC 7. As currently understood, benefits have not been calculated for eastern side of Bayou Lafourche. The exclusion of these benefits results in a reduced benefits to cost ratio.	Based on a preliminary analysis on the eastern side of Bayou Lafourche, the potential benefits are minimal because most of the structures are located along the ridge and there are only about 100 structures below the 100-yr elevation. Adding these benefits would have a negligible impact on the benefit-to-cost ratio.	PAC
CPRA8	Costs	PAC 8. It is understood that this is an authorization document that utilized the best available assumptions. As the project moves forward in the design/construction phase, it is understood that additional cost-savings can be realized in the future based on real-world data and thus provide a lower overall project cost.	Comment noted.	NA
CPRA9	Direct	PAC 9. Report may not clearly identify that impacts identified are based on existing marsh which will change over time and possibly reducing the impacts that are currently projected.	Wetland impact are determined by comparing with and without project impact using the Wetland Value Assessment (see appendix K. WVA accounts for the change in wetland over the 50 year period of analysis including the back ground loss rates.	RPEIS Appendix K
CPRA10	Mitigate	RPEIS 1. Section 6-69, Mitigation Plan: State should assume OMRR&R after successful completion of a mitigation project. If project fails to meet criteria, then re-construction to ensure these criteria are met should be considered a project expense.	In accordance with the project's statutory authority, the proposed mitigation actions will include construction, with the Non-Federal Sponsor (NFS) responsible for operation, maintenance, repair, restoration, and rehabilitation (OMRR&R) of functional portions of work as they are completed. On a cost-shared basis, USACE will monitor completed mitigation to determine whether additional activities (ex. further construction, additional plantings, etc.) are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved specified initial success criteria, monitoring & maintenance will be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet subsequent success criteria, USACE will consult with other agencies and the NFS to determine whether operational/management changes would be sufficient to achieve ecological success criteria. If, instead, structural changes are deemed necessary to achieve this success, USACE will instruct the NFS to implement adaptive management measures in accordance with contingency plans and subject to OMRR&R cost-sharing requirements, availability of funding, and current budgetary and other guidance.	RPEIS, Section 6.19; Appendix K
CPRA11	Buyout	RPEIS 2. Page 1-8, Environmental Justice: Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	RPEIS Summary; Section 6.14.8; Appendix J
CPRA12	Nonstructural/Other	RPEIS 3. Page 6-37, Section 6.14.4: Has impacts from the construction of levees to hurricane evacuation been identified for those communities located outside of the levee system?	Hurricane evacuation is a local responsibility, but temporary impacts to transportation system from the construction of levees will be documented in supplemental NEPA documents.	RPEIS Section 6.14.4

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
CPRA13	Economics/BCR	Economic Appendix: 1. Please clarify if the USACE factored as a benefit any potential reduction in cost of flood insurance policies or the number of policies required.	Current Corps policy prohibits including in the benefit-cost analysis a category representing the reduction in the cost of administering flood insurance policies when properties are removed from the 100-year floodplain under with-project conditions. To the contrary, the Corps encourages all property owners in a study area to maintain NFIP coverage as one of a wide array of available measures to reduce flood risk in a community.	Economic Appendix
CPRA14	Editorial/Clarification	PAC 1. Page iii, Funding Since Authorization: Please verify start date of PED and required contributions (PED for the Lock started in January 2000 and first contributions to the M2G project started in September 2002. Reference to WRDA should include appropriate references, including sections.	Reference to WRDA 1986 (PL99-662), Section 105(c) added to the second paragraph. First paragraph revised as follows: The Energy and Water Appropriations Act of 1998 (PL105-62) included funds to initiate design on the HNC lock feature of the Morganza to the Gulf project, which initiated the Preconstruction Engineering and Design (PED) phase for the HNC lock feature in advance of completing the Feasibility Report (2002) and signing of Chief's report (also 2002). The USACE and non-Federal sponsor signed a Design Agreement for the HNC lock in January 2000, and the non-Federal sponsor first contributed matching funds for PED in 2000. The first non-Federal contributions to the overall Morganza to the Gulf project were in September 2002. Approximately $61,650,000 has been allocated for the Morganza to the Gulf PED phase, which includes the PAC report. Most of the PED funds have been spent on engineering design and geotechnical investigations rather than on the PAC feasibility-level analysis.	PAC Page iii
CPRA15	Editorial/Clarification	2. Page vi, Levee and structure elevations: Page VI: Clarification is requested regarding increase by 6 feet to 18 feet (levee increases range between those values?). Clarification is also requested regarding the statement "authorized levee elevations varied from 9 to 15 feet (levee increases range between those values?).	Bullet revised as follows: Levee and structure elevations increased by several feet in all reaches and more than doubled in some reaches. Authorized levee and structure elevations along the authorized alignment vary from a minimum elevation of 9 ft National Geodetic Vertical Datum (NGVD) to a maximum elevation of 15 ft NGVD. Post-authorization levee elevations (for future conditions at year 2085) range from 15 ft North American Vertical Datum (NAVD88 epoch 2004.65) at the lowest point to 26.5 ft NAVD88 at the highest point, and structure elevations range from 17 ft NAVD88 at the lowest structure to 33 ft NAVD88 at the highest structure.	PAC page VI;
CPRA16	Editorial/Clarification	3. Page vii, Environmental mitigation features: Clarification is requested regarding the statement of "creation of 1,352 acres of wetlands". This differs from the direct impacts of approximately 4,113 acres.	Bullet revised as follows: Environmental mitigation features for the previously authorized project included creation of 1,352 acres of marsh habitat. Mitigation for the post-authorization constructible features only (levee reaches F-1, F-2, G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate) include creation of 136 acres of intermediate marsh and 780 acres of brackish marsh. For the remaining programmatic project features, mitigation costs and land requirements were estimated, but the exact number of acres will be determined in the future as more specific designs are completed and impacts are assessed in future NEPA documents. Overall, the post-authorization project could directly impact 4,113 acres of wetlands.	PAC Page vii
CPRA17	Editorial/Clarification	4. PAC Summary Report Page ix, Environmental Considerations: Note should be included clarifying that future wetlands loss would occur without the project.	Do not concur: Wetland impact are determined by comparing with and without project impact using the Wetland Value Assessment (see appendix XX). WVA accounts for the change in wetland over the 50 year period of analysis including the back ground loss rates.	PAC Summary
CPRA18	Editorial/Clarification	5. Page xi, Summary of the Post-Authorization Project: Please clarify between FY14 Program Year Cost and Fully Funded Year Cost	Reports clarified as follows: Construction of the project would be funded 65 percent by the Federal Government and 35 percent by the non-Federal sponsor. Federal implementation of the post-authorization Morganza to the Gulf project would be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies as described in this report. The total first cost for the project, inclusive of associated investigation, environmental, engineering and design, construction, real estate, mitigation, supervision and administration, and contingency costs, is $10,265,100,000 (October 2012 dollars). The fully funded total project cost (includes inflation) is approximately $12,872,846,000. These costs do not include the non-Federal sponsor's OMRR&R costs.	PAC xi
CPRA19	Editorial/Clarification	6. Page 14, Funding and Cost-Share: Please verify start date of PED and required contributions (PED for the Lock started in January 2000 and first contributions to the Morganza to the Gulf project started in September 2002.	Revised consistent with the response and revised text in response to CPRA 14.	PAC pg 14
CPRA20	Editorial/Clarification	7. Page 19, Figure 2-2: Please reference the statement in this figure "Damages when Federal levees fail due to erosion from wave overtopping. Damages from overtopping and rainfall not calculated." If these two statements are separate conditions then they should be listed separately to limit possible confusion.	Figure 2-2 has been revised to clarify.	PAC Figure 2-2
CPRA21	Editorial/Clarification	8. Page 21, Table 6.1: Please clarify whether the note referencing sea level rise was applied to the still water level or if it is contained in the wave heights.	Sea level rise was considered in both the still water level and the wave heights.	PAC Page 21
CPRA22	Editorial/Typos	9. Page 35, Section 4.2: The last sentence on this page references Section 5.5.1; however, there does not appear to be any relevant section.	The reference to section 5.5.1 was a typo; the correct reference is 6.5.1.	PAC page 6.5.1
CPRA23	Editorial/Clarification	10. Page 54, Table 6-1: Please clarify the relationship between the C-North levee section and the Larose to Golden Meadow levee system regarding what assumptions were made on still water and wave heights.	Section 2.8.2 of the Engineering Appendix explains the methodology used to determine the design elevations for these reaches. Tables in this section show the still water levels and wave heights used. For the Larose C-North reach base hydraulic boundary conditions from the 2010 Morganza to the Gulf ADCIRC model were used. The Lockport to Larose and GIWW reaches used the 2010 West Shore Lake Pontchartrain ADCIRC base hydraulic boundary conditions.	PAC Engineering Appendix Section 2.8.2
CPRA24	Editorial/Clarification	11. Page 63: Section 6.5.1: Paragraph states that 1,000 structures would remain outside the system. However, page 35 states that 6,000 residential structures in lower Bayou du Large and Bayou Grand Caillou an additional 70 structures in Isles de Jean Charles are in the 100-year floodplain. Clarification is requested regarding the differences between these figures.	Revised the section to clarify that the 6,000 residential structures from the 2002 report included areas along the bayou ridges south of Houma (including some structures that are now inside the authorized/PAC alignment) and the 1,000 structures is the number of structures outside the authorized/PAC alignment.	PAC Section 6.5.1
CPRA25	Editorial/Clarification	12. Page 65, Table 6-8 : Does the 2% AEP elevations for Larose to Golden Meadow utilize the same sea level rise calculations and/or the same methodologies for determining wave elevations?	Yes.	NA
CPRA26	Editorial/Typos	13. Page 68, Section 6.81.1: Please clarify reference to "worker years of labor annually"? Is this the correct reference to utilize or should it be based on hours?	It should have been total worker years of labor (not annually). The units have been corrected in the PAC report and the Economic RED Appendix.	PAC Section 6.8.1.1 Economic RED appendix
CPRA27	Editorial/Clarification	14. Page 80, section 7.4.3: Paragraph states "The environmental control structures would be used for drainage of isolated areas within a certain timeframe and maximum inundation of the marsh areas." If this information is contained in the Engineering Appendix, then please include a reference. If information is not contained that defines time durations then estimated values, definition or methodology should be included.	The generic reference to the Engineering Appendix was deleted because the information is located is a reference to the Engineering Appendix, not in the Engineering Appendix that is part of the PAC report. The reference is "Annex 1 Hydrology, Hydraulics and Water Quality Appendix H MTOG-Environmental Control Structures Study," which can be provided upon request.	PAC Section 7.4.3
CPRA28	Editorial/Clarification	15. Page 80, table 7-2: It would be more informative to also list the total number of days per year each structure was closed, if available.	A spreadsheet with the closing and opening dates/times for each floodgate closure can be provided but is too detailed to include in the main PAC report. Text intro to the table has been revised to indicate: "Most closure durations were less than 48 hours. The longest closure was during Tropical Storm Alex in 2010 when the Humble Canal and Little Caillou floodgates were closed 10 to 12 days."	PAC Table 7-2
CPRA29	Editorial/Clarification	16. Page 84, Section 7.7.2: Paragraph states "If, instead, structural changes are deemed necessary to achieve ecological success, the USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance. Please clarify as to what the contingency plan entails or include references to the appropriate section of the report.	The mitigation plan for habitat impacts associated with the constructible project elements has been revised (see RPEIS Section 6.19 and Appendix K), and now includes an adaptive management plan component. Be advised, however, that it is impossible to anticipate all possible corrective actions that might be required to ensure mitigation success following transfer of the project to the Non-Federal Sponsor. If unanticipated problems occur, then the NFS, HET, and USACE would need to work together to develop a plan (contingency plan) to correct or minimize these problems.	PAC Section 7.7.2; RPEIS Section 6.19; Appendix K
CPRA30	Editorial/Clarification	17. Page 84, Section 7.8: For clarity, it would be beneficial to include figures for the total marsh acres needed and the "additional" mitigation costs to construct the remaining acres.	Concur. A footnote will be added to Table 7-3.	PAC Section 7.8 Table 7-3
CPRA31	Editorial/Clarification	18. Attachment 3, Inundation Maps: MTOG Inundation Maps (50 Year and 100 Year Inundation for Years 2010, 2035, 2085): Were the depth damage analysis model runs entered for the Thibodaux area and no impacts were identified?	The Thibodaux area south of Bayou Lafourche was modeled. As shown on the maps, under existing conditions (2010) and base conditions (2035), Thibodaux is not impacted until the 500-year event. Under future/end of period of analysis conditions (2085), Thibodaux is impacted for the 100-year event and less frequent events.	PAC attachment 3
CPRA32	Editorial/Typos	19. Figures 12 and 14, C-north and Lockport to Larose Levee Alignment: Figures appear to incorrectly show the location of the GIWW floodgates instead of further east where the alignment crosses this waterway.	Noted. Figure was updated in Final Report to show correct location for GIWW gate at Larose.	PAC figures 12 and 14
CPRA33	Editorial/Typos	RPEIS 1. Page 1-8, Environmental Justice: In reference to the statement "This study complies with the requirements of Executive Order 12989." The correct Executive Order is 12898.	Typo corrected	RPEIS Summary
CPRA34	T&E	RPEIS 2. Appendix A, Environmental Supporting Information: Information does not appear to include current information pertaining to recent changes to Endangered and Threatened Species Act. Please clarify if there are any new study data in the project area that would warrant inclusion.	Concur. Errata to BA being prepared to address	RPEIS Appendix A
CPRA35	T&E	RPEIS 3. Appendix A, Environmental Supporting Information: Please clarify why this document lists species that are not found in the project area (i.e. Finback Whales) and listing of locations that would appear to be outside of the project area (i.e. Raccoon Island).	Concur. Errata to BA being prepared to address	RPEIS Appendix A

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CPRA36	Editorial/Clarification & Inconsistency	RPEIS 4. Appendix C: Clean Water Act 404b, page 37, Section G - Determination of Cumulative Effects on the Aquatic Ecosystem: Please clarify the whether the statement that the project would cause a decrease in water temperature and an increase in dissolved oxygen levels is correct. Please note that on page 16, it states that the project could cause a decrease in dissolved oxygen, which is the opposite of what is contained in Section G.	Comment note; corrected in document	RPEIS Appendix C
CPRA37	Economics	Economic Appendix: 1. Table 8, FEMA Flood Claims by Parish 1978-2011: The table references number of claims paid; however, a claim amount was not included for each respective parish. Additionally, is it clearly noted that there are two separate sources for damage claims during flood events, those that would be claimed under the FEMA policy and those that fall outside of the FEMA flood policies.	This table does not include loss incurred by residents without flood insurance.	PAC Economic Appendix
LDWF1	Indirect/gate closures	Info is both insufficient & inconsistent, espec floodgate and envir structure design and op plans. Cumulative impacts of structural protection to productivity and sustainability of La estuarine areas are difficult to determine. Particular concern is high prob that floodgates & envir structures will close for salinity control purposes more often and for longer periods in future. Suggest design & op uncertainties be resolved immed so reliable predictions of impacts can be determined.	Concur A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
LDWF2	Indirect/gate closures	WVA does not adequately quantify impacts to fisheries prod. Need to incorporate types and # of floodgates & envir control structures that will be present in levee design; how structures will be operated; how structures could affect fish access to & from critical habitats; & how structures could affect recruitment of commercially and recreationally important aquatic species. Unclear how aquatic organisms respond to/use these structures. Don't assume comparability to natural conditions. Species of concern: white & brown shrimp, blue crab, eastern oyster, gulf menhaden, redfish, spotted seatrout, black drum, striped mullet, bay anchovy, and Atlantic croaker.	The mitigation of the indirect and direct impacts to wetlands using the WVA will mitigate for fisheries resources. The WVA is a habitat model that was built not to determine the best wetlands but provide a benefit for fish and wildlife that use the wetland habitat. During PED additional fisheries impact analysis (such as CASM) can be done to determine if there are any additional impacts. This would use the updated H&H model that will include sea level rise	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LDWF3	Mitigate	Need detailed wetland & fisheries mitigation plan outlying specific projects; include LT monitoring & be flexible. Clarify that projects aren't part of levee mitigation plan. Envir benefits of levee construction are exaggerated in document. Additional fisheries production impact anlysis(w & w/o separate restoration projects) for each species of concern listed in #2 should also be conducted.	The mitigation of the indirect and direct impacts to wetlands using the WVA will mitigate for fisheries resources. The WVA is a habitat model that was built not to determine the best wetlands but provide a benefit for fish and wildlife that use the wetland habitat. During PED additional fisheries impact analysis (such as CASM) can be done to determine if there are any additional impacts. This would use the updated H&H model that will include sea level rise	RPEIS, Section 6.19; Appendix K
LDWF4	Eco Proj	Other restoration projects deserve more discussion in No Actional Alt scenarios. Should also discuss 1% and 3% AEP if and how presence of a levee could negatively impact effectiveness of other restoration projects.	The levee system was designed to have minimum impacts on existing ecosystem projects. These effects may change under different sea level rise scenarios and operation schemes.	NA
LDWF5	Indirect	Cum impact benefits from levee construction need supporting evidence, espec when most benefit appears to be provided by other restoration programs & negative impacts from presence of a levee are more likely. Cum impact sections in main doc list only benefits and minimal impacts, where in App C it shows that more frequence and longer duration structure closures could lead to more substantial impacts.	Concur. Cumulative impacts analysis and documentation were revised accordingly.	RPEIS Section 3.5.3; 6.18

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LDWF6	Indirect/gate closures	Sec 6.5.2 needs clarification on salinity reduction and its effects on both inside & outside system. Lack of research on fish passage thru various structures. No detailed descriptions of closure impacts due to timing & duration espec w/regards to increased SLR.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LDWF7	Nonstructural/Other	Sec 6.14.5 needs discussion of non-structural alt including, but not ltd to elevating structures & roads	A discussion of the use of nonstructural measure and ring levees to address the uncertainty in sea level rise is included in the risk and uncertainty section	RPEIS Section 6.14.5
LDWF8	Indirect	Sec 6.16.2 doesn't address rec & commercial boats being trapped outside system during storm events, subsequent closures, and assoc econ impacts.	Notifications of a gate closure before storm events is a local responsibility. TLDC already has an email list to notify interested parties of potential closures . The HNC will have a lock on it which will be operable for a longer time into a storm event.	RPEIS Section 6.16.2
LDWF9	T&E	LNHP records show potential impact to a bald eagle nesting site. If work for project commences during nesting season, conduct a field visit to worksite to look for evidence of nesting colonies no more than 2 wks before project starts. If active nesting colonies are found, further consultation with LDWF is reqd.	Concur. This section was revised to include LDWF restrictions on work near colonial nesting birds and bald eagle nests and consultation requirements with LDWF as required.	RPEIS Section 6.7
EPA1	EJ	EPA recommends that the USACE perform an appropriately detailed EJ analysis, immediately begin additional outreach and public involvement, consider alternatives to a buyout, and provide a detailed analysis of how buyout alternatives would avoid additional or cumulative, disproportionate impacts on EJ areas and communities.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA2	EJ & Tribes	Compliance with Executive Order (E.O.) 13175 (environmental justice) and formal government to government coordination with all federally recognized tribes (especially Chitimacha Tribe) was not documented or conducted. Also engage state recognized tribes and other stakeholders.	E.O. 13175 "Consultation and Coordination with Indian Tribal Governments" does not apply to state-recognized tribes or stakeholders. State-recognized tribes identified by the EPA include the Isle de Jean Charles Band, Point au Chien Tribe, the United Houma Nation, and the Biloxi-Chitimacha Confederation. CEMVN may engage state-recognized tribes and other stakeholders through the NEPA process and/or as interested parties through the Section 106 process. Federally-recognized tribes were engaged through both the NEPA and Section 106 processes. Hill and Hughbanks concur that consultation with federally-recognized tribes was not documented in the draft RPEIS and that the consultation with federally-recognized tribes in accordance with E.O. 13175, the National Historic Preservation Act (NHPA), and the National Environmental Policy Act (NEPA), as well as additional laws, executive orders, presidential memoranda, and USACE policies, regarding any activity that has the potential to significantly affect protected tribal resources, tribal rights, and/or Indian lands, should be documented in the final RPEIS. In an effort to continue government-to-government consultation in partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act, in a letter dated March 5, 2013, the CEMVN offered federally-recognized tribes the opportunity to review and comment on the potential of the proposed action described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands. Government-to-government consultation with federally-recognized tribes will continue as the plans for the programmatic features are refined.	RPEIS Summary; Section 7
EPA3	Buyout	USACE should develop and refine its preliminary buyout plan; Buyout options should include relocation of intact communities where the potential for irreparable harm exists for unique cultures, languages, and traditions that may be lost if the community is broken up, such as in the case of the Isle de Jean Charles. USACE should provide a schedule and detailed information for the proposed sequence of construction and buyout alternatives.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	NA

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EPA4	Indirect	In addition to avoiding and minimizing direct wetland impacts, the design and implementation of this levee system must focus on the larger and more complex challenge of minimizing indirect impacts to these valuable aquatic resources.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA5	Indirect & Socioeconomic	The Final Revised PEIS (FRPEIS) and highlighted in the summary should ensure that the public and decision-makers are informed of major long-term environmental and socioeconomic risk associated with the potential for increased frequency of gate and water control structure closure of this proposed levee system. These impacts should be assessed in the section on environmental consequences and how might these be addressed in the future.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Section 6.19; Appendix K
EPA6	Indirect	Finally, the USACE should consider discussing in the FRPEIS section regarding “unresolved issues”, as there does not appear to be a clear path forward identified for addressing this concern and ensuring adequate hydrology and navigation in the long term.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K

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EPA7	Risk/Induced	USACE should endeavor to ensure that residents in the area understand the residual flood risk that would remain while the project is being constructed and when it is complete, and work to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Residual Risk
EPA8	FWOP	Section 3.7.2 Wetland Loss should be revised to include all actions, past and present, that have led to coastal wetland loss. These actions include oil and gas extraction, pipeline canals, navigational projects, commercial and residential development, and global sea level rise.	Concur. Section 3.7.2 Wetland Loss was revised to include a more detailed account of all primary actions, past and present, that have led to coastal wetland loss. The 2004 programmatic Louisiana Coastal Area (LCA) Ecosystem Restoration Study has extensive documentation about wetland loss; this informationis included by reference into the FRPEIS.	RPEIS Section 3.7.2
EPA9	Indirect	Although the full extent of such negative impacts has not been adequately assessed, statements regarding the net indirect environmental effects of this levee system should at a minimum indicate that there is the potential for negative effects in the future – effects which might outweigh any potential near-term environmental benefits.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA10	Buyout & EJ	EPA recommends assess if implementation of constructible features would result in increased surge risk. If so, FRPEIS should include non-structural measures to address increased risk and assess disproportionate EPA recommends the USACE assess whether implementation of the constructible features would result in increased surge risk to properties and people outside the proposed levee system. If so, we recommend that the FRPEIS include as constructible features those non-structural measures needed to address such increased risk and assess this disproportionate impact in the EJ analysis.	A takings analysis will be prepared during PED to address this issue. At that time it will be determined what real estate interest, if any, would be acquired. Any inducted damages, if appropraite will be addressed during construction.	NA
EPA11	Air	Please include a discussion to clarify that 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). Also include the distinction that EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard.	The Air Quality section in the Final RPEIS has been revised to include the following: (A) The Lafourche Parish 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. The EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard. In a telephone communication with the Louisiana Department of Environmental Quality on March 19, 2013, it was noted that the maintenance plan for Lafourche Parish was lifted in 2004. It was also confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to conform to the de minimis levels of emissions. (B, C, D) In a telephone communication with the LDEQ on March 19, 2013, it was confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to meet the general conformity requirements for construction. No mitigation measures are necessary because Lafourche Parish is not required to conform to the de minimis levels of emissions. However, best management practices would be utilized to reduce all air emissions and particulate matter during construction.	RPEIS Section 5.2.9; 6.10; 7
EPA12	EJ	The FRPEIS should include a detailed socioeconomic analysis for potential EJ impacts comparing the demographics and potential environmental impact of those inside the levees with those who are outside the system. In addition, the USACE should consider the potential impacts of increased storm surge and flooding due to the timing of levee construction in the EJ analysis.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA13	Buyout	The USACE should develop additional alternatives for residents that are outside the proposed levee system (e.g., Isle de Jean Charles). This should include the buyouts as stated in the DRPEIS, but should also include non buyout alternatives like ring levees, house elevation, etc. Alternatives should recognize and protect the uniqueness of the Isle de Jean Charles community and maximize community cohesion by developing alternatives that have a concertedeffort to protect, buyout, or move Isle de Jean Charles residents as an intact community. USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	NA
EPA14	EJ	The USACE should use Census Block Groups or a geographic unit smaller than Tracts, to perform socioeconomic and EJ assessments in order to obtain a more accurate estimate of the demographics of the area and thus a more accurate depiction of the potential impacts of the proposed project. The USACE should discuss its rationale for the criteria used (e.g., 50% minority, etc.). A more in-depth analysis is needed in order to describe the minority make-up of the communities (e.g, Asian, Native American, etc.) and analyze the potential impacts of the proposed project that may affect each ethnic group differently.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J

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EPA15	EJ	The USACE should perform an EJ analysis characterizing and comparing these two populations. The DRPEIS should provide a similar level of detail on the buyout activities as it does for the engineering and economic aspects of levee construction.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA16	EJ	The USACE should directly contact the Chief of the Isle de Jean Charles Band of the Biloxi-Chitimacha-Choctaw Indians, the Point au Chien Indian Tribe, and United Houma Nation, and appropriate residents of these communities, so they can have meaningful participation in the NEPA and buyout processes. Given the remote and rural nature of these locations, solely advertising a public meeting in the Houma newspaper is inadequate. A more concerted effort to contact individuals in these communities is necessary because people may not speak English, receive local newspapers, and/or may have a fear of governmental authorities.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA17	Indirect	EPA believes that a majority of the resources were not properly evaluated for their environmental consequences. In most cases, impacts are stated in generalities and only the magnitude (the amount of change) is specified. However, the extent (how vast is the change), direction (how dynamic is the change), duration (how lasting is the change), and speed (how rapid is the change) of the impact should be disclosed as well. Otherwise stated, the Environmental Consequences chapter should discuss and analyze how and why the proposed project affects the overall health of the resources within the study area.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Section 6.19; Appendix K
EPA18	Indirect	EPA believes that the indirect impacts analysis has not fully disclosed the entirety of indirect impacts.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K

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EPA19	Indirect/gate closures	The Draft PAC Report asserts that the proposed environmental control structures in the levee system “mitigate for indirect impacts of the levee system by matching and/or enhancing existing drainage patterns during non-storm conditions” (Draft PAC Report, page ii). This statement should be amended to account for the potential long-term indirect impacts associated with the projected increase in the closure frequency of the system’s gates and water control structures.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA20	Indirect/gate closures	The Draft PAC Report states on page 83 that “The Habitat Evaluation Team determined that no indirect impacts to wetlands would result from the project.” A similar statement is made on page 6-62 of the DRPEIS. EPA takes issue with this assertion. While potential near-term hydrologic effects of the levee system could theoretically be negligible, the USACE’s own analysis regarding the frequency of gate and water control structure closure in the future strongly suggests that the project could result in significant long-term adverse impacts to wetlands, water quality, and fisheries (along with navigation).	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA21	Indirect/gate closures & Hydrology Impacts	The last sentence on page 19 of Appendix C states that “…the project would not induce significant changes on the hydrology of the estuary.” It is not clear how this could be consistent with the USACE’s projections regarding increased closure frequency of gates and water control structures in the long-term. While this section does discuss the possibility that the sponsor might wish to modify the closure criteria to address non-storm water stages, there is no discussion of the potentially significant changes in circulation that could occur with the increased closure frequency projected using the current closure criteria. As with other portions of the DRPEIS, EPA recommends the USACE describe the potential indirect impacts that could occur due to increased closure frequency of gates and water control structures due to relative sea level rise, with the focus in this section being on estuarine flow and current patterns.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . 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EPA22	Indirect/gate closures	The discussion of cumulative effects on the aquatic ecosystem on page 37 of Appendix C states that “No long-term, negative cumulative impacts are anticipated.” Here again, it is unclearhow the projections regarding future frequency of gate and structure closure could support such a conclusion.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K

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EPA23	Indirect	The FRPEIS should include a comprehensive indirect impacts analysis and fully disclose all effects caused by the action that occur later in time or are farther removed in distance.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA24	Indirect	The FRPEIS should include a comprehensive cumulative impacts analysis by establishing spatial and temporal boundaries for significant resources and including a list and description of past, present, and reasonably foreseeable future projects. An attempt was made to establish boundaries and list projects; however, much more detail is required. The analysis should include the overall impacts to the environment that can be expected if the individual projects and their impacts, including the proposed project, are allowed to accumulate.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA25	Editorial/Inconsistency	Table 6-1 direct wetland impact numbrs are inconsistent with Appendix C; numbers should be reconciled in the RFPEIS.	The mitigation plan for compensating habitat impacts produced by the constructible project elements has been revised (see RPEIS, Appendix K). This appendix has updated information concerning direct and indirect wetland impacts. Appendix C has been revised to be consistent with with these revised data.	RPEIS Table 6-1; Appendix K
EPA26	Borrow	The FRPEIS should include information demonstrating that there are no less environmentally damaging borrow sources for the constructible levee reaches. This same analysis of borrow site alternatives would also be needed for subsequent environmental reviews of the programmatic features. On this point, we would note that the avoidance of jurisdictional wetlands for borrow material is one of the significant environmental accomplishments of the expedited NEPA process for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System. We would encourage the USACE to work to repeat this important precedent.	Partial concur: Can not concur with the total avoidance of jurisdictional wetlands. Borrow sites have only been identified for the constructible features (levee reaches F-1, F-2, and G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate). For the remaining programmatic features, additional EISs or EAs would address borrow site impacts once borrow sites are identified. Since the borrow sources for the programmatic features are unknown at this time, the exact quantity and habitat types of impacted wetlands are unknown as well. The location of borrow sources for the programmatic features and the quantity and habitat types of impacted wetlands would be documented in supplemental EISs or EAs. Additional information will be provided in supplemental EISs or EAs to better demonstrate selection of the least environmentally damaging borrow sources. Additional discussion of the avoidance of jurisdictional wetlands would also be included. Furthermore, all necessary information disclosing the actions to avoid, minimize and reduce potential adverse impacts of borrow sources are documented in the Final RPEIS.	
EPA27	Air	Mitigation measures should be included in a construction emissions mitigation plan or similar document in order to reduce air quality impacts associated with emissions of NOx, CO, PM, SO2, and other pollutants from construction-related activities: provide specified mitigation measures for fugitive dust source controls	The Air Quality section in the Final RPEIS has been revised to include the following: (A) The Lafourche Parish 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. The EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard. In a telephone communication with the Louisiana Department of Environmental Quality on March 19, 2013, it was noted that the maintenance plan for Lafourche Parish was lifted in 2004. It was also confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to conform to the de minimis levels of emissions. (B, C, D) In a telephone communication with the LDEQ on March 19, 2013, it was confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to meet the general conformity requirements for construction. No mitigation measures are necessary because Lafourche Parish is not required to conform to the de minimis levels of emissions. However, best management practices would be utilized to reduce all air emissions and particulate matter during construction.	RPEIS Section 5.2.9; 6.10; 7
EPA28	Air	Provide specified mitigation measures for air quality mobile and stationary source controls	The Air Quality section in the Final RPEIS has been revised to include the following: (A) The Lafourche Parish 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. The EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard. In a telephone communication with the Louisiana Department of Environmental Quality on March 19, 2013, it was noted that the maintenance plan for Lafourche Parish was lifted in 2004. It was also confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to conform to the de minimis levels of emissions. (B, C, D) In a telephone communication with the LDEQ on March 19, 2013, it was confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to meet the general conformity requirements for construction. No mitigation measures are necessary because Lafourche Parish is not required to conform to the de minimis levels of emissions. However, best management practices would be utilized to reduce all air emissions and particulate matter during construction.	RPEIS Section 5.2.9; 6.10; 7

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EPA29	Air	Provide specified mitigation measures for air quality administrative controls.	The Air Quality section in the Final RPEIS has been revised to include the following: (A) The Lafourche Parish 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. The EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard. In a telephone communication with the Louisiana Department of Environmental Quality on March 19, 2013, it was noted that the maintenance plan for Lafourche Parish was lifted in 2004. It was also confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to conform to the de minimis levels of emissions. (B, C, D) In a telephone communication with the LDEQ on March 19, 2013, it was confirmed that Lafourche Parish is designated as "in attainment" for ozone standards and, therefore, is not required to meet the general conformity requirements for construction. No mitigation measures are necessary because Lafourche Parish is not required to conform to the de minimis levels of emissions. However, best management practices would be utilized to reduce all air emissions and particulate matter during construction.	RPEIS Section 5.2.9; 6.10; 7
EPA30	EJ	EPA strongly disagrees with statement on page 6-41 states "we have determined that there is no disproportionate impact to a minority or low income community. There is not adequate information in the DRPEIS to determine how the USACE came to the conclusion that there are no potentially disproportionate impacts to minority and/or low income communities. In addition to our comments regarding obtaining a more accurate estimate of the demographics of the area, the USACE should consider the potential EJ impacts of the timing of levee construction on minority and/or low income populations that may be directly, indirectly, or cumulatively impacted by the proposed action. In order to avoid disproportionate impacts to the Isle de Jean Charles tribal community, any buyout would need to relocate the community intact in an appropriate location with access to subsistence resources and with other attributes agreeable to the tribe. The tribal leader should be contacted immediately to begin appropriate discussions. Although not mentioned in the DRPEIS, USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts. As discussed in our Cumulative Impacts comments on page 9, the FRPEIS should include a more thorough cumulative impacts analysis and include those impacts on minority and/low income populations.	Based on the EPA comments, additional detailed EJ analysis is on-going. The results of the analyis have been incorporated into the FRPEIS. Major points are as follows: (a) Based on conversations with Sharon Osowski at the EPA, the analysis included Census block level analysis for race/ethnicity and Census tract level analysis for income/poverty for the entire study area using 2010 US Census data and the 2007 - 2011 American Community Survey 5-Year Estimates. (b) The analysis considered communities inside and outside of the existing and proposed levee system. Data at the Census block level for race/ethnicity from the 2010 US Census and the Census tract level for income/poverty obtained from the 2007 - 2011 American Community Survey 5-Year Estimates was used to identify potential EJ communities. (c) The additional analysis incorporated potential buyouts and uniform relocation assistance. (d) analysis was conducted on communities located partially within and outside of the proposed levee system in order to determine impacts on community cohesion. (e) The analysis for EJ was conducted at the Programmatic EIS level. In the future, additional analysis, outreach and public involvement would be conducted during Planning and Engineering Design and documented in supplemental NEPA reports that are tiered to the Programmatic EIS. See section 8 of the FRPEIS for a list of public and stakeholder meetings that has already occurred. Representatives of the following state recognized tribes, Biloxi-Chitimacha-Choctaw tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation were invited to these public meetings.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA31	Tribes	The DRPEIS does not provide enough information to determine whether the USACE is in full compliance with National Historic Preservation Act (NHPA), E.O. 12898, and others. The USACE should initiate consultation with Tribes regarding NHPA and initiate formal consultation with any federally-recognized Tribes under E.O. 13175 before finalizing the EIS.	Documentation of formal consultation with federally-recognized tribes pursuant to the 36 C.F.R. §800 regulations implementing Section 106 of the NHPA is included in the final RPEIS. The following eleven federally-recognized tribes were consulted pursuant to the regulations implementing Section 106 of the NHPA: 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 Tunica-Biloxi Tribe of Louisiana CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized tribes on June 15, 2012. In a letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." The SHPO concurrence was coordinated with federally-recognized tribes in a letter dated March 5, 2013. CEMVN will continue Section 106 consultation for the programmatic features through the identification and evaluation of historic properties as the plans for the features are refined. Future NEPA documents will assess the environmental effects of the programmatic features. See response to EPA2 regarding consultation pursuant to Executive Order 13175.	RPEIS Section 6.15; 7; Appendix H
EPA32	Indirect & Mitigate	Table 4-1 of the Draft PAC Report includes a reference to marsh impacts from the levee which are "self mitigated". It is not clear what this means, but it appears to be a reference to the idea that indirect hydrologic effects of the proposed levee project could provide wetland benefits that compensate for wetland impacts due to levee construction. EPA does not support such an assertion.	The term self mitigated has been removed. Note that the marsh impacts for this analysis were planned to be mitigated by calculating the amount of marsh that could be created using the organic overburden from the adjacent borrow to create marsh on site. This process provided both a cost saving from not having to haul off the overburden and by not having to locate a source of material for mitigation. There was no intent to imply that indirect hydrologic effect provided mitigation benefits.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
EPA33	Editorial/Clarification	Table 4-4 states that more than 3,000 acres of wetlands would be "displaced" by the preferred alternative. This wording suggests that fully compensating for wetland impacts is a simple endeavor with guaranteed success. We would suggest using more accurate wording such as "permanently eliminated" or "destroyed" instead of "displaced", followed by the caveat that the USACE will seek to provide full compensatory mitigation to offset such impacts.	Table 4-4 was revised with more precise and accurate terminology of "destroyed" wetlands. In addition this is caveated that the USACE will seek to provide full compensatory mitigation to offset the value of such impacts.	RPEIS Table 4-4
EPA34	Editorial/Clarification	Page 6-71 of the DRPEIS states that "In most cases, the establishment of mitigation sites would be done at the same time as construction of the levees and other project features." This statement is somewhat vague and may fall short of an explicit commitment to provide mitigation in advance of or concurrent with project implementation. For example, what is meant by "establishment of mitigation sites"? And what is meant by "In most cases…"? This statement should be re-written to include a commitment to provide mitigation in advance of or concurrent with project implementation, to the maximum extent practicable.	This section of the FRPEIS was revised to be more consistent with the standard mitigation timing set forth in regulations and to provide a more explicit commitment of the USACE to provide mitigation in advance of or concurrent with project implementation.	RPEIS Section 6.19.4; Appendix K
EPA35	EJ	Mitigation efforts should be developed and described that avoid potential disproportionate impacts of the proposed action that could result in the loss of community cohesion in all of the potentially affected communities south of the proposed levee system, in particular, the tribal community of Biloxi-Chitimacha on Isle de Jean Charles.	Concur all project features including mitigation sites have been and will be designed to the extent to avoid impacts including those that could induce an Enviromental Justice issue.	RPEIS Summary; Section 5.2.13; 6.14.8; 7; Appendix J
EPA36	EJ	The FRPEIS should provide documentation of recent scoping and public involvement events and actions. If scoping and public involvement did not take place for this revised action, the USACE should directly and immediately engage all interested, concerned, and affected stakeholders, including low income, minority, and tribal populations, including the Biloxi- Chitimacha tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation, before finalizing the EIS. EPA emphasizes that there is a need for continued interagency coordination on the constructible and programmatic features of the proposed project to ensure that wetland impacts are avoided and minimized in the subsequent NEPA processes. This is particularly the case for those levee reaches that would enclose wetland areas that are currently un-impounded and new portions of the overall levee alignment (e.g., the proposed Lockport to Larose Ridge levee extension)	Concur: Section 8 of the EIS was updated to include a list of meetings that where held for this project and specific meetings that included member of potential Enivronmental Justice Communities.	RPEIS Section 9
LDNR1?	Duplicate comment letter	References an attachment that is the same as the February 15 letter from Jimmy Anthony. See LDWF1.	The attachments to the email are the same as C20130001.pdf and C20130001.doc are the same as the February 15, 2013 LDWF letter signed by Jimmy Anthony. See response to LDWF1.	NA

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TLCD1	Editorial/Clarification	Overall Costs (pg. xi of summary)-the estimated costs in 2014 dollars is $10.544 Billion. But, the "fully funded" total is approx. $12.978 Billion. What makes the $2.443 Billion difference? Is it the inflation expected between 2014 and 2035 (the first year we get a closed Federal System)? Does it also included the local sponsor's 50 year O&M cost?	The total first cost (2014) does not include inflation and the fully funded cost includes inflation. This distinction has been clarified in the report. The local sponsor's 50 year OMRR&R cost is not included in the total project cost or the fully funded cost.	PAC Report Costs
TLCD2	WIK	Funding and Cost Share (Sec 1.7-pg. 14)-states that expenditures for the completed feasibility study {1995-2002) were $9.32 Million, which was cost shared on a 50-50 Federal-Non Federal Basis. About $61.650 Million has been spent on PED on a 75-25 Federal-Non Federal basis. Most of this $61 million was spent of E&D and geotechnical investigations since 2003. The Non-Federal partners will have to pay the Corps 10% of this $61 Million ($6.165 Million) because "WRDA stipulates that the non-Federal costs of design is the same percentage as the non-Federal share for construction costs, which in this case is 35%" The draft report states that the remaining 10% has to be paid to the Corps in the first year after the PPA is executed. When will the PPA be executed, before or after re-authorization from Congress? If the non-Federal partners take on the E&D costs of any project feature, I think the non-Federal partners should get credit for these efforts. In other words, rather than paying the Corps the $6.165 million we would spend our non-Federal funds on E&D of a MTG project, like the Lock Complex.	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
TLCD3	WIK	Non-Federal Sponsor Work Independent of the Federal Authority (Sec 1.8--pg. 15)—ln the original 2003 Chief's report, the non-Federal sponsor (State DOTD and TLCD) had agreed to build 21.5 of the original 72 miles of levee and 2 floodgates (Bayou Pointeaux-Chenes and Bush Canal) with the 3 mile Reach J-1 being separately authorized by Congress in 2004 at a $4 million cost. The original 21.5 miles in the Chief's report included Reaches H-2, H-3, I, J-2, J-1, and J-3 covering from the location of the MTG Little Caillou Floodgate eastward to the parish line in Pointe-aux-Chenes. The first levee lift of all of this 21.5 miles of the alignment has either been constructed or will be under construction by 2015. The 3 mile first lift of Reach J-1 was built by TLCD (and CPRA) in 2006-2008 for a total cost of $18 million. Will the re-authorization of MTG under the PAC report account for the difference in costs of Reach J-1 or will we need special language to account for this? With the continued support from the State and the fact that TLCD has recently passed a second local sales tax to help build the MTG project, it is the Non-Federal sponsor's intent to build much of the first lift of this system from the Upper part of Reach Bon the west side of Bayou Dularge to the east side of Reach Lin Cut Off, LA in Lafourche Parish. We also intend on building flood protection improvements along the MTG Western Tie-in along Bayou Black in western Terrebonne. We understand that Congress would have to enact express authority for the nonfederal sponsors to get "look back credit" for the advance work undertaken by the nonfederal sponsors. We have and will continue asking our Federal Congressional Delegation to include such language in any future WRDA bill.	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
TLCD4	Economics/BCR	Analysis Years (Sec 2.1--pg. 17)--The 50 year "life" of the Federal MTG system would be between 2035-2085. The soonest time we could expect a completed 1% AEP is 2035, however we should be able to have some benefits of a closed system by 2024. Does the "closed system" mean that the entire 98 miles of levee has to have a first lift? Has the Corps included benefits of a partially closed system such as connecting some of the existing ridges. For example, it seems that having a partially closed system between Bayou Dularge to Bayou Lafourche (Reaches E-L) would provide some benefit to the project area.	The term "closed system" indicates that a continuous flood risk reduction system is in place. The proposed construction schedule for the recommended plan in the PAC Report produces a continuous alignment of structures (some existing, some newly constructed) and levees (first and second lifts) across the entire project by 2024, and allows for partial benefits to begin accruing in that year. A partially-closed system would only provide risk reduction for storms approaching from specific tracks. Since there is no way to statistically isolate specific storm tracks in our economic benefits models, there is no way to extract project benefits out of the model for a partially-closed system.	NA
TLCD5	Editorial/clarification	Location of Structures Outside of Risk Reduction System (Figure 4-1--pg. 35)--The area of lower Chauvin/Cocodrie is mislabeled as Bayou Grand Caillou/Dulac. I suggest a brief summary of the 4 areas outside of the MTG alignment in Terrebonne would be beneficial. They are as follows (from east to west): 1. Isle de Jean Charles. 2. Lower Chauvin/Cocodrie 3. The Four Point area in lower Bayou Grand Caillou/Dulac. 4. Lower Bayou Dularge.	Map has been corrected and the descriptions provided above have been added to the PAC report.	PAC Figure 4-1
TLCD6	Editorial/clarification	Preliminary Evaluation of Alternative Levee Alignments {Sec 4.3--pgs. 36-40)--ln 2008, the N.O. Dist. Corps evaluated 4 alternative alignments before moving forward with the PAC Report. One of these alternatives was (#3} suggested by NGO's and it is referred to as the "Multiple Lines of Defense Strategy". After this analysis, it was determined that the authorized alignment would be the most cost effective and least damaging to the wetlands. I suggest that the Final PAC report should refer back to the Memo from Gen Walsh to Col Lee in Nov, 2008 directing the Alignment to follow the authorized alignment. A copy of this Memo should be made part of the Report Appendices.	USACE guidance memos are not incorporated as appendices to feasibility reports because they are deliberative, internal agency discussions.	NA
TLCD7	Compliment	Modifications to the Authorized Alignment {Sec 5.1--pgs. 41--50)--This section of the draft report has a very good and detailed explanation of the process used for the 5 modifications that have been made along the authorized alignment. I can appreciate the effort this has taken, having participated and witnessed this process for 2 of the 5 modifications.	Comment appreciated.	NA
TLCD8	WIK	Non-Federal Responsibilities (Sec 8.3{b)--pg. 87)--States that the Non-Federal sponsor shall not use funds from other Federal Programs as part of the nonFederal match. Any funds expended from other Federal sources, such as FEMA or CDBG, will not be counted as the non-Federal 35% match. One future source of funding should be clarified as to whether OCS funds can be used toward the non-Federal 35% requirement. Considering Congress granted this revenue to the 5 gulf states in 2006, I assume it would be eligible.	WRDA 2007 changed that prior standard of not using Federal funds to meet non-Federal cost sharing. Section 2007 of WRDA 2007 "USE OF OTHER FEDERAL FUNDS", states: "The non-Federal interest for a water resources study or project may use, and the Secretary shall accept, funds provided by a Federal agency under any other Federal program, to satisfy, in whole or in part, the non-Federal share of the cost of the study or project if the Federal agency that provides the funds determines that the funds are authorized to be used to carry out the study or project.	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
TLCD9	Realign/Lower Dularge	Non-Federal Responsibilities (Sec 8.3{s)--pg. 89)--This paragraph deals with "betterments" of the Federal system. This states that the non-Federal sponsor has to "Pay all costs due to any project betterment" to the Fed Government. My question is that if the non-Federal sponsors are paying regardless, I assume we do not have to use the Corps for project betterments. The best example of a project betterment for the MTG alignment would the lower Dularge area discussed above. I think we, as non-Federal sponsors, would want to handle all these efforts on our own.	Lower Dularge area was not included in the project authorized in WRDA 2007 and is not part of the recommended plan in the 2013 Post Authorization Change (PAC) Report. Options for pursuing a Federal flood risk reduction system for this area include: (a) For projects with construction costs of $7M or less, a flood risk reduction system could be investigated under the Corps CAP (Continuing Authorities Program) project authority. (b) Congress could direct the Corps to incorporate Lower Dularge into the Morganza to the Gulf project area. (c) The Corps and the Non-Federal sponsor could agree to investigate a Locally Preferred Plan (LPP) in a future Morganza to the Gulf Post Authorization Change (PAC) report that would extend the levee alignment to include lower Dularge. In order for an LPP to be recommended, the LPP must be economically justified (BCR greater than 1.0) and any difference (increase) in construction cost must be funded 100% by the Non-Federal sponsor.	NA
TLCD-PM1	WIK	1. How are deviations from the Report accepted or considered in PED phase? Will J-1 be approved as work in kind upon authorization or signing of PPA?	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
TLCD-PM2	Editorial/clarification	2. In the timeline presented on page 11, I think it would be prudent to show the FEMA claim events or tropical events that have occurred over the existing timeline. Table 3-2 in RPEIS depicts this information but it could be shown in this timeline as well.	Added the tropical storms from table 3-2 in the RPEIS to the timeline in the main PAC report.	PAC page 11 Timeline
TLCD-PM3	HSDRRS/Site adapt	3. Section 1.5 How can the standards applied in HSDRRS be adapted to fit MTG?	The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	NA
TLCD-PM4	WIK	4. Section 1.7 Instead of cash payment can we put money towards design or construction? This comment refers to bringing the 75/25 Report cost share to the 65/35 construction cost share.	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
TLCD-PM5	Editorial/clarification	5. Section 1.9 TLCD does not control or maintain 92 miles of levees. This may be a combination of TPCG local drainage levees and TLCD levees.	In Table 1-3, changed "Terrebonne Levee and Conservation District (TLCD)" to "Non-Federal Levees in Terrebonne Parish" and the description to "In Terrebonne Parish, there are approximately 92 miles of non-Federal levees, along with several pump stations and floodgates, which are operated and maintained by either the Terrebonne Parish Consolidated Government or the Terrebonne Levee and Conservation District (TLCD). The TLCD has recently started building components of the authorized Morganza to the Gulf project, including 9 miles of first-lift levees and interim barge gate structures on several critical bayous."	PAC Table 1-3
TLCD-PM6	Editorial/clarification	6. Section 2.7 Not enough distinction describing local levees that are built as a base of MTG and parish drainage levees.	Added the following section headings to better differentiate: 2.7.1 Drainage Levees and Levee-Like Features in Terrebonne Parish, 2.7.2 Non-Federal Levees Constructed as a Base for the Morganza to the Gulf Project, and 2.7.3 Development of Fragility Curves for Local Levees and Levee-Like Features.	PAC Section 2.7.1; 2.7.2; 2.7.3
TLCD-PM7	HSDRRS/Site adapt	7. Section 2.8 Overtopping criteria could be better adapted to account for the interior reservoir capacity of MTG thus reducing footprints. This refers back to developing MTG standards adapted from HSDRRS standards.	The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	NA
TLCD-PM8	Editorial/clarification & typos	8. Section 4.2 Information is not detailed enough and section 5.5.1 seems to be omitted from the report	Section 4.2 was expanded to provide a brief description of each of the four communities (approximately 1,000 structures) residing outside the authorized Morganza to the Gulf alignment. The reference to section 5.5.1 was a typo; the correct reference is 6.5.1.	PAC Section 4.2

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
TLCD-PM9	Cost	9. 6.2 While I know geotechnical considerations are very conservative in this report, as they should be, recent construction projects have yielded better results. Especially along the natural bayou ridges and consolidated portions of the alignment. In light of these conservative estimates and the massive quantities associated with this project, actual conditions could change the borrow needs greatly. This could change the estimated project costs by orders of magnitude. Likewise, changes in criteria could also reduce quantities, settlement, and cost greatly.	Comment acknowledged.	NA
TLCD-PM10	WIK	Section 6.4 Should local mitigation efforts be mentioned and is it creditable work?	(a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
TLCD-PM11	Buyout	11. Section 6.5.1 The buyout assumption stated here assume complete structure buyout when there is existence of elevated structures which will not be bought out or be bought out at a reduced rate. As stated this is the most conservative scenario and the actual costs realized could be reduced from estimates.	The exact mitigation measures for the structures identified in the preliminary buyout plan has not yet been determined. Presently, detailed information regarding the differences in frequency, depth, and duration of the flooding between the future without-project and future with-project conditions is not available. This detailed information typically would be assessed in light of the uses to which the particular land is zoned, and the appropriate mitigation methods, if any, would be implemented to address the effects of the Federal project. To ensure that the public is informed of all potential impacts of the project and to prevent future delays to project schedule, for purposes of this report, the worst case scenario (most expensive option) has been assumed, which would be a 100 percent buy-out of all of the structures in the impacted areas. The potential induced damages and mitigation for economic damages would be further addressed during detailed design and supplemental NEPA documents. Individual investigation and devising mitigation for each structure, if appropriate, would be done during PED. Additional factors (height of structures vs. induced stages, type of residential structure, social concerns, etc.) would have to be investigated under PED. Each structure would have to be evaluated under PED to determine if mitigation is appropriate. Further modeling would be performed during PED to determine whether there is a potential taking. A Takings Analysis would be prepared during PED to address this issue, and at that time, it would be determined what real estate interest, if any, would be acquired.	NA
TLCD-PM12	Costs	12. Section 6.6 Can we have a detailed breakdown of O &M costs and assumptions to be understand the local obligations for the project?	Detailed O&M spreadsheet was provided to the commenter.	NA
TLCD-PM13	Economics/BCR	13. It is stated that the HNC lock complex is a part of other projects or studies. Is MTG given credit for fully bearing the costs of this project?	The Morganza to the Gulf project only claims the National Economic Development (NED) benefits of the HNC lock complex, which could have been achieved less expensively with a floodgate, but Congress authorized the HNC structure as a multipurpose lock, not a floodgate. The National Ecosystem Restoration (NER) benefits of the HNC lock complex were quantified in the LCA study "Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock."	NA
TLCD-PM14	RSLR & Costs	14. The incorporation of relative sea level rise add material, mitigation to the MTG project. Should the estimated levels be lower levees may not need to be lifted to the final design elevations. Structures would however be designed at these conservative heights. The intermediate seal level assumption is chosen for MTG but it seems that low level assumption would be acceptable for the same reason the intermediate level was chosen. Please provide more detail. As stated this could change the overall costs of the project by 99 million dollars.	The Low RSLR scenario was not selected as the basis for design because the Low RSLR scenario is based on RSLR trends continuing into the future at historic rates, and the three National Research Council (NRC) future projections are all based on accelerating sea level rise. The Intermediate RSLR scenario is actually based on the lowest acceleration projected by the NRC. Section 6.9 of the main PAC report provides a sensitivity analysis of potential cost savings or additions if Relative Sea Level Rise (RSLR) is lower or higher than expected under the Intermediate RSLR scenario.	NA
TLCD-PM15	Editorial/Clarification	15. Section 7.3.2 Will environmental structures be built to final design elevations and what sequence will they be constructed as they relate to the reaches they are contained in.	Environmental structures would be built to their final (2085) design elevations. In general, the construction schedule assumes that environmental structures would be built towards the end of the first levee lift and/or at the beginning of the second levee lift within each reach. All environmental structures would be constructed in the 2016 to 2024 timeframe. The environmental structures in reaches E, J, G, H, and K would be the first to be built (2016 to 2019) and the environmental structures in reaches A, L, Barrier, and Larose to Lockport would be the last to be built (2020 to 2024).	NA
TLCD-PM16	Costs	16. Average haul distances can be greatly reduced (25 miles one way) thus changing the construction costs for these projects greatly.	Response noted.	NA
TLCD-PM17	Cost share	17. Non Federal Responsibilities in this report are listed in several pages in this report while federal obligations are listed only in several sentences. This would not seem to reflect the 65/35 federal/non federal cost share.	A complete list of non-Federal sponsor cost sharing requirements is required by ER 1105-2-100 para. 4-3(b)(2).	NA
TLCD-PM18	Editorial/Clarification	18. Please clarify the differences between fully funded MTG and FY14 costs.	The total first cost (2014) does not include inflation and the fully funded cost includes inflation. This distinction has been clarified in the report.	PAC Costs
TLCD-PM19	Editorial/Clarification	RPEIS Comment 1. Section 3.7.2 Would the implementation of MTG reduce the amount of converted open water areas?	This determination cannot be made at this time. The levee and mitigation will fill some open water area, but borrow pits may create more open water areas.	NA
TLCD-PM20	Editorial/Inconsistency	RPEIS Comment 2. Lake Boudreaux Freshwater Introduction does not seem to appear in the list of CWPPRA Projects	Concur: Lake Boudreaux Freshwater Introduction has been added.	RPEIS Section 3.11.3
TLCD-PM21	FWOP	RPEIS 3. Section 5.1 Would it be pertinent to list the things that have greatly affected the environmental setting of this area such as closure of Bayou Lafourche in 1903, the construction of channels, canals, roads and oilfield activity? These are mentioned in the Section 5.2.10 and also in Section 6.2 but I think it is important to note that all of these things make up the environmental setting in addition to the fact that the basin is a freshwater/sediment starved system.	Concur. Section 5.1 is a brief summary of generally important aspects of the environmental setting. Each significant resource also include historic and existing information about the environmental setting pertinent to that specific resource.	RPEIS Section 5.1
BEND1	Floating levee	Floating levee idea.	The floating levee design does not meet the geotechnical or structural requirements of the HSDRRS criteria which are currently being used in the design of the project. If, in the future, the design criteria for the Morganza to the Gulf project change the floating levee concept could be reinvestigated.	NA
JOHN1	EIS Request	Requested a copy of the EIS.	Website provided.	NA
HUTC1	Contracts	How can contractors get on the bidders list?	Information on the Bid process can be found at http://www.mvn.usace.army.mil/ebs/cont_doingbiz.asp	NA
KRON1	EIS Request	Requested a copy of the EIS.	Website provided.	NA
STRA1	Realign/Private Landowner	Provided a map of CL&F property.	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA
HALE1	Realign/Private Landowner	Levee alignment impacts future development.	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
GICA1	GIWW	GIWW sector gate size in PAC vs. what was modeled	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
GICA2	GIWW	Concerns over safety of narrower gates	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
GICA3	GIWW	Conduct additional modeling with different data	Nonconcur The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
GICA4	GIWW	Include navigation stakeholders in additional modeling	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
GICA5	GIWW	Include second order navigation impacts	The GIWW gate sizes were changed in the PAC report from the original feasibility report as a cost saving measure. Gates are designed to the authorized channel width (125'). (Note: WRDA 07 language does not mention gate widths, but authorizes project in accordance with 2002 and 2003 Chief's Reports. The 2002 Chief's report calls out one 125' floodgate on GIWW below Bayou Lafourche and two 125' floodgates on GIWW near Houma. The 2003 Chief's report does not mention GIWW gates.). In order to assure flows through the structures could be maintained at speeds less than 3 mph for safety reasons, ERDC modeled a 175 ft sector gate at the Houma site with six 16 ft sluice gates. At the Lafourche site ERDC modeled a 125 ft sector gate with three 16 ft sluice gates. Further analysis of the Houma site revealed that a more cost effective plan that still achieved the target flow levels, is one that has a 125 ft sector gate with nine 16 ft sluice gates. Both the modeled gates and designed gates have substantially similar openings to ensure the same velocities. Safety: If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
RESTOR1	Eco Proj	This levee would utilize the GIWW, and presumably include structures to allow freshwater to be released to the south when levels permit, but it also raised questions about impacts to hydrology to the north as well as the south.	The Floodgates on the GIWW would be designed in such a way as not to intefere with the predicted future flows along the GIWW.	NA
RESTOR2	Eco Proj	A basic question that arises is the compatibility of the project's recommended alignment with coastal restoration. La Coastal Prot & Rest Authority Board sent Aug 20 & Oct 16, 2012 letters that suspended study & design on 3 CR projects. If the State thinks that restoration projects aren't compatible with impacts of preferred levee alignment, that raises questions about how the levee project will ultimately impact the area...Report doesn't say why State requested the Atchafalaya project to be put on hold	The project was designed to not interfere with existing and proposed ecosystem restoration projects. Use of the GIWW to divert freshwater is not a component of the Morganza project, but is a component of the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project. The LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project is authorized by Congress and therefore should be considered as part of the future without and future with project conditions. The reason that the State requested that the LCA projects be put on hold was not based on the Morganza to the Gulf project. There was no determination by the State that the project would interfere with the LCA projects. In addition, a project similar to the LCA project is included in the State 2012 Master Plan. Furthermore, funding from the recent Deepwater Horizon oil spill fines will be released to impacted states, including Louisiana, for ecosystem restoration efforts. Hence, the authorized LCA project is a reasonably foreseeable project and should be addressed in both the future without and future with project conditons.	NA
RESTOR3	Risk	Levees create a false sense of seccurity among people who believe that they, their children, and their investments will be safe from harm, no matter what.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Residual Risk
RESTOR4	Sustainability	Sustainability is the key concept.	Comment noted	NA
OSTH1	Realign/Private Landowner	Requests levee realignment	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	PAC Section 5
LEAN1	RSLR	First, sea level rise as a result of global warming is accelerating. The most recent scientific studies have concluded that at least one meter of sea level rise over the next century is likely.	The rate of future RSLR is highly uncertain. The High RSLR scenario was not selected as the basis for design because it could lead to unnecessary expenditures associated with overbuild if the actual RSLR is less than the High RSLR scenario (4.75 ft over the next 75 years). By 2085, the High RSLR scenario is approximately 2.5 ft higher than the Intermediate RSLR scenario, which is the basis for design. Since the structures were designed to include 2 ft of structural superiority (2 ft higher than the levees), the Morganza project could be adapted to the High RSLR scenario with additional lifts added to the earthen levees. Section 6.9 of the main PAC report provides a sensitivity analysis of potential cost savings or additions if RSLR is lower or higher than expected under the Intermediate RSLR scenario.	PAC Section 6.9
LEAN2	Resiliency	Levees with wetlands and other natural barriers in front of them stand the best chance of surviving major storms, rather than levees in direct or near direct contact with open water.	The protection for levees provided by wetlands and other natural barriers is a function of the amount of storm surge and wave attenuation provided by those features. The degree of protection provided by those features is unknown and varies depending on storm intensity, direction, speed and other factors. There is currently no verified modeling or other information that quantifies the amount of protection provided by these features or the extent of those features needed to have a measurable impact.	NA

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LEAN3	RSLR	Coastal marshes can respond to sea level rise to some degree by vertical accretion, provided they have sufficient inputs of freshwater and nutrient	Concur: LCA Project Convey Atchafalaya waters to Northern Terrebonne and Multipurpose use of the HNC lock would have had the potential to provide that freshwater and nutrient input.	NA
LEAN4	Cost	Estimated costs of the Morganza to the Gulf Project have increased significantly over the life of the project	Implementation of more robust Hurricane and Storm Damage Risk Reduction System (HSDRRS) design standards and storm surge modeling are the major causes of the cost increases.	NA
LEAN5	RSLR	High level RSLR scenario for the project area is the most accurate and should be the reference for the project design	The rate of future RSLR is highly uncertain. The High RSLR scenario was not selected as the basis for design because it could lead to unnecessary expenditures associated with overbuild if the actual RSLR is less than the High RSLR scenario (4.75 ft over the next 75 years). By 2085, the High RSLR scenario is approximately 2.5 ft higher than the Intermediate RSLR scenario, which is the basis for design. Since the structures were designed to include 2 ft of structural superiority (2 ft higher than the levees), the Morganza project could be adapted to the High RSLR scenario with additional lifts added to the earthen levees. Section 6.9 of the main PAC report provides a sensitivity analysis of potential cost savings or additions if RSLR is lower or higher than expected under the Intermediate RSLR scenario.	PAC Section 6.9
LEAN6	Resiliency	Levees with wetlands (marshes, swamps) and other natural barriers in front of them are more sustainable than those exposed to open water	The protection for levees provided by wetlands and other natural barriers is a function of the amount of storm surge and wave attenuation provided by those features. The degree of protection provided by those features is unknown and varies depending on storm intensity, direction, speed and other factors. There is currently no verified modeling or other information that quantifies the amount of protection provided by these features or the extent of those features needed to have a measurable impact.	NA
LEAN7	Eco Proj	Design for the authorized Louisiana Coastal Area Study (LCA) project to divert Atchafalaya River water to Terrebonne Marshes. A long distance sediment pipeline project from the Atchafalaya River to the eastern and central Terrebonne basin will apparently be retained.	The LCA Project Convey Atchafalaya waters to Northern Terrebonne and multipurpose use of the HNC lock is not a long distance sediment pipeline project. The MtoG project will not interfere with the LCA Project, but the LCA Project was put on hold per letter from the State.	NA
LEAN8	Eco Proj	The LCA also included a Terrebonne Basin Barrier Shoreline Restoration Project, and a Land Bridge between Caillou Lake and the Gulf	Comment noted	NA
LEAN9	Eco Proj	Scientific researchers and some private organizations are working to demonstrate the value of oyster reefs for both habitat restoration and storm surge buffers. Oyster reefs have the added value of being able to establish themselves quickly, enhancing their value as "speed bumps" for storm surge from the Gulf	Comment noted	NA
LEAN10	Cost	The Project's estimated costs rose by more than 20% following Hurricane Katrina and subsequent changes in hurricane levee standards, necessitating a reauthorization process under the Water Resources Development Act Section 902	Concur with this statement.	NA
LEAN11	WIK	non-federal sponsors of the project have undertaken construction of up to 9 miles of "what would amount to first lift levees" along several reaches, integrationg the efforts will be critical for efficiency	Concur (a) In order to balance the accounts when moving from the 75% Federal/25% Non-Federal cost share in Pre-Construction Engineering and Design (PED) phase to the 65% Federal/35% Non-Federal cost share in Construction phase, the Non-Federal Sponsor will have to make up any difference in the cost share between the Design Agreement and the Project Partnership Agreement (PPA) in the first year of the PPA. All costs for design and construction will be rolled up in to one sum in the PPA, and the conditions set forth in the PPA will apply. If the PPA stipulates that the Non-Federal sponsor shall be credited for Work In Kind (WIK) in lieu of cash payment, then the WIK credit (subject to all applicable requirements) may be used to balance the accounts forwarded from PED. The non-Federal sponsor is encouraged to submit an official written request to the Corps for any additional clarification on applying WIK credit to account balances forwarded from PED. Note that the PPA cannot be executed until the project is designated as a Construction New Start. Requirements for a Construction New Start include congressional authorization, congressional appropriation of Construction funds and a signed Record of Decision (ROD) on the environmental document. (b) The PAC Report includes feasibility-level designs, which are considered approximately 25% designs that have been completed based on limited data collection (soil borings, surveys, environmental investigations, etc.). As the Corps proceeds to the detailed design phase for features of the Morganza to the Gulf project, we will continue to refine designs as we acquire additional information. Following completion of the 2002 Feasibility Report, several features of the project were refined based on additional soils data obtained and opportunities to reduce environmental impacts and project costs. These features included the Houma Navigation Canal Lock Complex (wider sector gate, different configuration), and Levee Reaches A, G, H and J (smaller footprint). Similarly, features recommended in the 2013 PAC Report may be refined as those features get to the detailed design phase. Reach J-1 was constructed prior to execution of a Project Partnership Agreement (PPA), and prior to execution of a Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. In order to receive Work In Kind (WIK) Credit for Reach J-1, Congress would specifically have to include a provision for look-back credit and a PPA must be executed between the Department of the Army and the non-Federal sponsor. (c) Mitigation is considered a construction cost and may be creditable as Work In Kind (WIK) depending on the terms and conditions set forth in the Project Partnership Agreement (PPA) or the Memorandum of Understanding (MOU) for Work Provided or Performed Prior to Execution of a PPA. The non-Federal sponsor is not eligible for WIK credit unless a PPA has been executed, an MOU has been executed in advance of a PPA, or WIK credit has been specifically authorized by Congress.	NA
LEAN12	State master plan	"a major challenge for the Morganza project is how to integrate it into… coastal protection and restoration as outlined by the State Master Plan."	Comment noted.	NA
LEAN13	Indirect/gate closures	Closure under current conditions would occur approximately 1.5 days per year, but under the High RSLR Scenario this would rise to 24 days per year by 2035 and 365 days per year by 2085. Those estimates, like the ones for maintenance costs, do not include possible responses to major storm impacts in the interim, which could result in the system becoming largely or totally closed much sooner.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K

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LEAN14	Indirect/gate closures	Increased closure of the structures would have significant effects on the fishery resources of the area and the communities who depend on them. Egress for estuarine species, access for fishermen, water quality	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LEAN15	Rainfall	there does not seem to be discussion of the possibility of high water on the inside of the levee system while surge is approaching from the Gulf. Combination of rain and surge and multiple storms not addressed	The proposed Federal levee is not expected to impact rainfall damages in the populated areas during or after construction. The populated areas are located within forced drainage levee systems. Rainfall would continue to be pumped outside of the local forced drainage levee systems and into an area that would be surrounded by the proposed hurricane levee, leaving storage between the Federal and local levee systems. When impacts of the proposed Federal levee on the interior area were modeled, the only appreciable difference in water surface occurs when the levees are overtopped at the less frequent return intervals. Given the large storage areas behind the Federal levee (e.g. Lake Boudreaux), and environmental control structures throughout the levee alignment, additional pumping capacity for rainfall is not needed.	NA
LEAN16	Cost	series of lifts of substantial portions of the levee...adds substantially to the project cost, and to the engineering challenge involved in building and raising these sections, and rebuilding would be necessary after storms	Comment noted.	NA
LEAN17	Realign/MLODS	We are not convinced that the other option – the "Multiple Lines of Defense" (MLOD) alignment – has been adequately assessed, or that it has been too quickly dispensed with as less cost-effective, since the engineering and repair costs of the more southerly authorized alignment are likely to be higher than estimated due to the effects of sea-level rise and storms on construction and maintenance	The MLODS alternative was a preliminary alternative that was not carried forward and evaluated to the same level of detail as the other two alternatives along the authorized alignment. As described in section 4 of the PAC report, the MLODS alternative was screened out because it would cause more induced flooding and have less internal storage in the case of overtopping (higher residual risk).There is also a greater impact on BLH that has a higher mitigation cost compared to impacts to marsh.	NA
LEAN18	Realign/MLODS	The MLOD 2008 Report proposed an alternative incorporating a series of ring levees and natural barriers outside the levees to increase their stability/resiliency, including marshes and cypress stands. If increasing salinity levels render cypress stands unworkable, there has been substantial research at Louisiana universities on the expansion of black mangroves in the coastal zone and their utility as storm surge buffers.	Comment noted	NA
LEAN19	Time	estimated 20 year-plus time frame for completion of the authorized alignment, along with its escalating costs, only serves to elevate the question of whether this option truly represents the best means of "protection"	Comment noted.	NA
LEAN20	Time & Reformulate	The need for protection is real and urgent enough to allow for a re-evaluation of alternatives and the potential for new combinations of actions that could provide that benefit in a more effective and timely manner,	Comment noted.	NA
LAC1	NEPA Compliance	Will the Final EIS need to have additional supplements to fulfill the legal requirements of NEPA?	This doument fulfills the the legal reguirments of NEPA for a programmatic EIS. Per the progrmatic NEPA document that this is, supplemental NEPA would be required once authorization and details are developed on the programmatic features, but not on the consructable features.	NA
LAC2	Realign/MLODS	There is no detailed review of the MLOD Alternative 3, (USACE 2013b, p. 36) in the DPAC nor the DRPEIS. It appears the only criterion used to reject the MLOD alternative is that it abandons the location of the HNC structure used in the TSP. If a moveable sill as placed in the Canal to stop the saltwater intrusion, the main structure could be moved north to coincide with the MLOD protection levee where it would cross the Canal.	The MLODS alternative was a preliminary alternative that was not carried forward and evaluated to the same level of detail as the other two alternatives along the authorized alignment. As described in section 4 of the PAC report, the MLODS alternative was screened out because it would cause more induced flooding and have less internal storage in the case of overtopping (higher residual risk).There is also a greater impact on BLH that has a higher mitigation cost compared to impacts to marsh.	NA
LAC3	Economics/BCR	What are the costs and benefits fo using the MLOD Alternative 3	Based on the preliminary B/C analysis conducted in 2008, the MLOD Alternative 3 was similar in cost to Alternative 1 (authorized alignment) but the benefits were lower, so it was screened out and not included in the final array of alternatives evaluated in 2013.	NA
LAC4	Economics/BCR	A benefit/cost analysis, Table 4-1 (DPAC, p. 38), includes all the alignments but was completed in 2008 (5 years ago). Is there a B/C analysis for 2013?	The B/C analysis conducted in 2008 was for the preliminary alternatives only, which included the MLODS alignment. The B/C analysis conducted in 2013 was for the final alternatives only, i.e. the 1% and 3% AEP levels of risk reduction along the authorized alignment.	NA
LAC5	Economics/BCR	Since the alignments of segments have been changed and there is now 98 miles of levees (a 26 mile expansion), these changes must be included in an updated B/C analysis.	The updated B/C analysis for the final array of alternatives included costs for the entire 98-mile alignment.	NA
LAC6	Economics/BCR	The B/C Ratio for Alternative 1 (TSP) is only 1.07, which is barely over 1.0. These calculations came before new structures and an addition of 26 miles of levees were added to the project.	The updated B/C analysis for the final array of alternatives included costs for the entire 98-mile alignment. The updated B/C ratio for the TSP is 1.3.	NA
LAC7	CAR	The DRPEIS is incomplete as voiced by USF&WS. "....this Supplemental Coordination Act Report does not fulfill the requirements of the Fish and Wildlife Coordination Act and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act." (Dec. 6, 2012, USF&WS letter to Col. Fleming).	A more rigorous design analysis, impacts assessment to all significant resources and related mitigation analysis, including coordination with the USFWS for revisions to the CAR were conducted, consistent with all laws, regulations and policies, and coordinated with the HET and resource agencies before being clearly documented in the FRPEIS before the ROD is signed.	RPEIS Appendix B

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
LAC8	Indirect & NEPA	We are concerned that the Final PEIS will also be incomplete. It appears to us that the NEPA process is piecemeal and that the cumulative affects are not being addressed	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC9	Indirect & NEPA	The piecemealing of the project evades the proper NEPA process by putting off the comprehensive evaluation of impacts of the entire project.	This doument fulfill the the legal reguirments of NEPA and is not piecemealing. Per the progrmatic NEPA document that this is, supplemental NEPA would be required once authorization and details are developed on the programmatic features, but not on the consructable features.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC10	Indirect & NEPA	The DRPEIS withholds important information to be used by the public and agencies in evaluation of the project	Do no concur	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC11	Indirect & NEPA	The documents also avoids the cumulative environmental impacts of MtG project.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC12	Borrow	The borrow sites have not been selected for all the segments.	This is a programatic NEPA Document and as such all details are not required. Borrow sites have been identified for the constructible features (levee reaches F-1, F-2, and G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate). For the remaining programmatic features, additional NEPA documents will address borrow site impacts once borrow sites are identified. Additional information will be provided to better demonstrate selection of the least environmentally damaging borrow sources. Additional discussion of the avoidance of jurisdictional wetlands will also be included.	RPEIS Section 6.2; 6.18; 6.19; Appendix G; Appendix K
LAC13	Borrow	How do we know the direct and indirect impacts to wetlands if the borrow sites have only been identified for three out of 21 levee segments	Borrow sites have only been identified for the constructible features (levee reaches F-1, F-2, and G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate). For the remaining programmatic features, additional EISs or EAs would address borrow site impacts once borrow sites are identified. Since the borrow sources for the programmatic features are unknown at this time, the exact quantity and habitat types of impacted wetlands are unknown as well. The location of borrow sources for the programmatic features and the quantity and habitat types of impacted wetlands would be documented in supplemental EISs or EAs. Additional information will be provided in supplemental EISs or EAs to better demonstrate selection of the least environmentally damaging borrow sources. Additional discussion of the avoidance of jurisdictional wetlands would also be included. Furthermore, all necessary information disclosing the actions to avoid, minimize and reduce potential adverse impacts of borrow sources are documented in the Final RPEIS.	RPEIS Section 6.2; 6.18; 6.19; Appendix G; Appendix K
LAC14	Buyout/expand	The use of non-structural measures to avoid loss to structures outside the levee system is a good approach and we are glad to see this added to the DRPEIS. We believe that more non-structural alternatives can be used for this project to reduce long-term costs.	Comment noted	NA
LAC15	Borrow	Constructible feature borrow sites have been identified; however, for future lifts, it is assumed that borrow material will come from yet to be identified government-furnished borrow areas. The current status of unknown supply locations may be a concern to project reviewers/approvers." (USACE, 2013d, p. 1-9)	Borrow sites have only been identified for the constructible features (levee reaches F-1, F-2, and G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate). For the remaining programmatic features, additional EISs or EAs would address borrow site impacts once borrow sites are identified. Since the borrow sources for the programmatic features are unknown at this time, the exact quantity and habitat types of impacted wetlands are unknown as well. The location of borrow sources for the programmatic features and the quantity and habitat types of impacted wetlands would be documented in supplemental EISs or EAs. Additional information will be provided in supplemental EISs or EAs to better demonstrate selection of the least environmentally damaging borrow sources. Additional discussion of the avoidance of jurisdictional wetlands would also be included. Furthermore, all necessary information disclosing the actions to avoid, minimize and reduce potential adverse impacts of borrow sources are documented in the Final RPEIS.	RPEIS Section 6.2; 6.18; 6.19; Appendix G; Appendix K
LAC16	Borrow	The report states that borrow sites for only 3 out of 21 levee segments have been identified. Which habitat types will be directly impacted by the location of the unnamed borrow sites?	The borrow for the constructible features comes from adjacent areas to the levee. These have been identified in the Map book and on the plates in the engineering appendix. They are primarily open water with some intermediate marsh.	RPEIS Appendix G

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LAC17	Indirect/Enclosed	We did not see an estimate of the enclosed wetlands acreage included in the DRPEIS. What is the current estimate of wetland acreage on the protected side of the levee system? The correct wetlands acreage should be added to the FRPEIS for each of the four Alternatives presented	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
LAC18	Economics/BCR	The correct wetlands acreage of the four Alternatives presented must be used in any new B/C Ratio calculations	B/C ratios only include costs and benefits in dollars and includes the cost of mitigation	NA
LAC19	Direct	Reference Direct Impacts to wetlands for 1% AEP Alternative: The document states that there are 4,113 acres directly impacted by the construction of the TSP levee system. Does the levee footprint include: 1) the width of the borrow canal? 2) the offset between the LAC letter MtG, DRPEIS 3 berm and the borrow canal? 3) A 50 ft buffer zone from toe of slope? The entire impacted footprint of each levee section must be included as part of the direct impacts and wetland losses	The term "levee footprint" refers only the toe-to-toe width of the levee itself. The direct impacts and wetland losses are calculated based on the Right-of-Way limits (include the levee footprint, the borrow canal and the widths of the offsets required for both levee stability and borrow pit stability) plus the extents of the proposed mitigation areas. The Right-of-Way limits and proposed mitigation areas are depicted in Mapbook Appendix for the Draft Revised Programmatic EIS.	RPEIS Appendix G
LAC20	Indirect/Enclosed	Each Alternative alignment presented in the PAC report should include the total number of wetland acres enclosed by the levee system. The report does not include this information. This is another inadequacy of the DPAC.	The two alternatives that were carried through to the final evaluation have the same alignment and will enclose approximately the same number of acres of wetlands.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
LAC21	Indirect	The cumulative impacts of the 1% AEP Alternative and other planned or ongoing measures will be stabilization and potential enhancement of wetlands and marsh habitat throughout the study area." (USACE 2013d, p. 6-49). This is not supported by other statements in the document. If the gates are closed because of RSLR and the wetlands are isolated from the GOM, how will this be an enhancement?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC22	Indirect & Hydrology Impacts	The disruption of sheet flow is also an environmental impact.	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
LAC23	Indirect/gate closures	Does the Corps know how to manage a "leaky" levee over the 50 life of the project?	Coment noted	NA
LAC24	Indirect	In some areas, the proposed levee would restrict fish access to navigable and environmental structures only." (USACE 2013d, p. 6-48). The document continues: "Planned and on-going measures along with 1% AEP Alternative measures will likely be beneficial to the ecosystem and to recreation resources in numerous ways as habitat for various stages in the life-cycles of fish and wildlife are stabilized, protected, improved, and expanded. Improved fish habitat will increase the numbers and variety of fish, which will be beneficial to recreational fishing." (USACE 2013d, p. 6-49). The statement is not supported by the document. It is speculative and is counter to other statements made in the DPAC and DRPEIS	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC25	Indirect	Eliminating sheetflow in some areas will negatively affect fisheries. Spawning fish and invertebrates would be funneled into the culverts which may have higher velocities than natural for organisms to move between the protected and unprotected sides of the levees. Has this been discussed with the resource agencies?	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K

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LAC26	Indirect/gate closures	Will the critical velocities be maintained for water flow through the culverts and other structures over the life of the project?	Culvert sizes, and numbers where looked at to maintian the required velocities and will be looked at in detail in supplemental NEPA documents.	NA
LAC27	HSDRRS/support	We strongly support the incorporation of the post-Katrina engineering design criteria-especially the new soil standards into the federal levees. The material incorporated into these local levees must meet the post-Katrina Federal standards for earthen levees.	Comment noted.	NA
LAC28	Geotech	Any local earthen levees, to be incorporated into the Morganza to the Gulf federal levee system, must meet these new post-Katrina soil standards. One weak link in the system and there could be a catastrophic failure. We hope that proper soil borings with adequate spacing were taken through all the local levees to be included in the federal system.	The number/location of soil borings is sufficient for a feasibility level study. If the project is re-authorized, additional borings would be taken during PreConstruction Engineering and Design (PED).	NA
LAC29	Geotech	The detailed soil borings have not yet been taken. The data from these borings may alter the design or placement of some levee sections. We are surprised that these geological/engineering data have not been collected yet.	The number/location of soil borings is sufficient for a feasibility level study. If the project is re-authorized, additional borings would be taken during PreConstruction Engineering and Design (PED).	NA
LAC30	Indirect/Enclosed & Indirect/Sediment	In reference to impacts to fisheries and marshes by a "leaky" levee system. the wetlands will be isolated from storm surges which carry suspended sediments. It has been shown that suspended sediments distributed inland by storms and cold fronts are part of the natural process of wetlands nourishment (Roberts etal, 2012). Marshes can be sustained by only millimeters of suspended mineral sediments deposited annually. Without this influx of suspended sediments, the marsh will continue to subside, drowning the marsh, thus turning the enclosed area into open water. We request that the Corps and other agencies look at this process before agreeing to enclose and isolate 80,000 acres of wetlands	Several NGOs noted that regular tidal fronts can deposit sediment into connected coastal marshes and stressed the importance of leaving estuarine systems open to maintain a sustainable ecosystem. They also noted that the Morganza to the Gulf levee could increase the speed of coastal erosion by blocking sediments from moving through the system. The Habitat Evaluation Team discussed these assumptions and concluded that although the project would prevent some sediment deposition (a potential negative indirect effect of the project), the levees could also prevent surge and waves from destroying interior wetlands (a potential positive indirect effect). USFWS noted that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise. Since the net effect of sediment deposition impacts with the project compared to without the project (no action) is unknown and highly speculative, the Habitat Evaluation Team agreed that it should not been quantified for the indirect impacts analysis at this time, but rather, discussed qualitatively in the Final RPEIS.	RPEIS Section 3.5.3
LAC31	Indirect	What are the environmental costs if these marshes are lost to productivity	Indirect impacts are calculated in terms of loss of Average Annual Habitat Units (AAHUs). Potential loss of AAHUs for the constructible features will be reported in the Final RPEIS. If the projec is re-authorized, potential loss of AAHUs for the programmatic features will be reported in future EISs or EAs.	RPEIS Section 3.5.3; 6.18; 6.19; Appendix K
LAC32	Indirect/gate closures	the isolation of the wetlands over time will reduce the fisheries productivity in Terrebonne Parish. Fisheries species need unimpeded access to the interior fresh and intermediate marshes for spawning and juvenile growth. Will the number of culverts and navigational openings be sufficient over the 50 year life of the project to assure ingress and egress of fisheries species?	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project. Culvert sizes, and numbers where looked at to maintain the required velocities for aquatic organisms with the coordination of the resource agencies. It will be reevaluated in PED and will be documented in supplemental NEPA documents.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
LAC33	Indirect & Hydrology Impacts	Will the openings compensate for the elimination of sheet flow?	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project. Culvert sizes, and numbers where looked at to maintain the required velocities for aquatic organisms with the coordination of the resource agencies. It will be reevaluated in PED and will be documented in supplemental NEPA documents.	RPEIS Section 3.5.3
LAC34	RSLR & Hydrology Impacts	concerns about the sustainability of the 6x6 ft culverts which will cross under the levees. Because of high subsidence rates where the levees cross marshes (especially Reaches J, K, L), how will the Corps assure that water circulation will be maintained as these levee segments subside?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA
LAC35	RSLR & Hydrology Impacts	There are many examples of highway embankments in which culverts were installed to maintain water circulation. These failed to provide normal hydrology over the life of the project because subsidence of the embankment and filling in of the culverts.	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA
LAC36	RSLR/Subside	Will the culverts be built on pilings?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA
LAC37	RSLR/Subside	How will the cross sectional areas be maintained over the life of the project?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA
LAC38	RSLR/Subside	As RSLR increases, how will this affect the movement of water through the culverts over the life of the project?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
LAC39	Indirect/gate closures	the PREIS states that because of Relative Sea Level Rise (RSLR), the openings in the levee system will have to close if the water levels reach +2.5 ft; If the system must remain closed for even 24 days per year, what affect will this have on fisheries?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC40	Indirect/gate closures	the PREIS states that because of Relative Sea Level Rise (RSLR), the openings in the levee system will have to close if the water levels reach +2.5 ft; If the system must remain closed for even 24 days per year; If the closure comes at critical times for migrating fisheries how will this affect the productivity of the Terrebonne marshes?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC41	Indirect/gate closures	The trigger elevation may vary at different structure locations and will be further refined in the final PAC report." This information should have been included in the DRPEIS	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K

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LAC42	Indirect/gate closures & enclosed	We are equally concerned (as USFWS (added)) 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 in MLOD (Alternative 3).	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC43	Mitigate	We do not accept the Corps' concept of mitigation (e.g. using some material dredged from a linear borrow pit to create marsh). The remaining canal will be a permanent disruption to the environment, its depth will exceed the normal depth of the open water in the marsh and could become anoxic. While the use of the organic material for marsh creation is acceptable, the mitigation should be more than 1 to 1. Will the linear canals be a benefit or detriment to the ecosystem? This must be discussed in the final report.	Per regulation mitiagion will be 1 to 1 based on habitat value.	RPEIS Sectoin 6.19; Appendix K
LAC44	Mitigate	Will mitigation projects be located on the Gulf side or the protected side of the levee system?	Mitigation features provided as compensation for wetland/habitat impacts associated with the constructible project elements would all be located on the flood side of the proposed levee system. Most mitigation projects provided for wetland/habitat impacts associated with the programmatic project elements would likely be located on the flood side of the levee system; however, the possibility of some mitigation being located on the protected side of the levee system cannot be excluded at this stage. Such mitigation would likely be restricted to habitat impacts on the protected side of the levee system. These issues will be addressed in future supplemental NEPA documents.	NA
LAC45	Mitigate	We are also concerned that the project could stimulate additional clearing of bottomland hardwoods for agriculture. These indirect impacts also need to be mitigated.	The future development of any jurisdictional wetland would continue to be managed by the 404 permit process. No additional lands would be put under pump by this project so the conversion of BLH to agricultural land is not expected.	RPEIS, Section 6.19; Appendix K
LAC46	Indirect	An estimated 88,700 additional acres [138 sq. miles] are considered marginally developable although wetlands." Does the Corps still consider the wetlands, included in the TSP, to be "marginally developable" ? If so, these wetlands should be identified and added to the impacts of the project.	The future development of any jurisdictional wetland would continue to be managed by the 404 permit process. No additional lands would be put under pump by this project.	NA
LAC47	Question/Clarification	It is stated in the Report that the area will have protection when the first levee lift is completed. In what year will that happen?	Subject to re-authorization and sufficient project funding, the current construction schedule assumes a complete system (but not yet to 1% AEP risk reduction level) in place by 2024.	NA
LAC48	Question/Clarification	According to USACE (2013c, Appendix 404(b)(1) evaluation), building the levee system to base year elevations will take 20 years and be completed in 2035. Does this mean that the project area will not have 1% risk reduction until 2035?	Correct. Subject to re-authorization and sufficient project funding, the current construction schedule assumes a 1% AEP risk reduction level by 2035.	NA
LAC49	Outreach	do citizens living behind the proposed levees know that their protection will take 20 years?	The construction schedule assumptions were included in the Draft PAC report that has been available for public review since January 4, 2013 and have been briefed at many TLCD and Parish council meetings.	NA
LAC50	Indirect/Enclosed	While we support hurricane protection for developed areas along the coast, we question a hurricane protection project in which 63% of the area to be protected are wetlands and water bottoms	The wetland and open water areas behind the proposed Federal levee provide a large internal storage area in the case of heavy rainfall or levee overtopping, which reduces residual risk to people and property. Levee alignment alternatives located closer to development do not offer that benefit.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC51	Indirect/Enclosed	While we support hurricane protection for developed areas along the coast, we question a hurricane protection project in which only 10% of the project area is identified as urban land.	The wetland and open water areas behind the proposed Federal levee provide a large internal storage area in the case of heavy rainfall or levee overtopping, which reduces residual risk to people and property. Levee alignment alternatives located closer to development do not offer that benefit.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
LAC52	Economics/BCR	We also question an economic analysis which would choose such a preferred alternative (1% AEP Alternative as TSP).	The benefits analysis is consistent with USACE policy and has been technically reviewed. The TSP was chosen based on the plan that maximized net benefits (benefits minus costs).	NA
GULF1	Realign/MLODS	The basis of our concerns lies in the deviation of the preferred alignment from a ‘Lines of Defense’ strategy taken elsewhere on the Louisiana coast.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Section 10.2
GULF2	Realign/MLODS	A Lines of Defense strategy allows for and entails the restoration and re-integration of protective coastal processes and features such as land-building and land-sustaining river floods, forested ridges, large expanses of interior and exterior marsh wetlands, and barrier islands--while planning for elevation and floodproofing of homes behind protective features, as well as planning for regular evacuation events.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Section 10.2
GULF3	Realign/MLODS & Culture	A lines-of-defense strategy also includes planning for relocation of distal coastal communities when and where it is necessary, so that coastal cultures can be maintained wherever possible.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Section 10.2
GULF4	RSLR/Subside	The outward alignment selected as the preferred alternative has a long history, and was chosen before the latest science on the subsidence within the project area was as well understood. The preferred alignment is an alignment designed with “erosion,” or loss of wetlands from the distal end of the basin inward, as the primary mechanism of coastal land loss; it is now understood that subsidence is the primary geological mechanism by which the interior marshes have been lost and the primary threat to the land within the project area in the future.	Comment noted	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
GULF5	Indirect/Enclosed	In addition to this new understanding, we have learned more about the negative effects of impounding wetlands behind levees and roads from this very project area.	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
GULF6	Indirect/Sediment	Regular tidal fronts can deposit a non-trival amount of sediment into connected coastal marshes, giving even more credence to the MLOD strategy of leaving estuarine systems connected for flood risk reduction, and thus striking a balance between flood protection and a sustainable ecosystem.	Several NGOs noted that regular tidal fronts can deposit sediment into connected coastal marshes and stressed the importance of leaving estuarine systems open to maintain a sustainable ecosystem. They also noted that the Morganza to the Gulf levee could increase the speed of coastal erosion by blocking sediments from moving through the system. The Habitat Evaluation Team discussed these assumptions and concluded that although the project would prevent some sediment deposition (a potential negative indirect effect of the project), the levees could also prevent surge and waves from destroying interior wetlands (a potential positive indirect effect). USFWS noted that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise. Since the net effect of sediment deposition impacts with the project compared to without the project (no action) is unknown and highly speculative, the Habitat Evaluation Team agreed that it should not been quantified for the indirect impacts analysis at this time, but rather, discussed qualitatively in the Final RPEIS.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
GULF7	Indirect/gate closures	It is very likely that the changes in sea level rise will ensure that the gates will be increasingly closed, until, as sea level rises above 2.5 feet + NAVD, the gates will remain permanently closed. The increasing, then permanent closure of these gates will not only weaken the remnant or restored wetlands in this area, but also inhibit and then restrict the water-dependent economic activity which sustains the coastal communities resident in the areas to be protected.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K
GULF8	Risk	the project as proposed would mislead the public into a presumption of flood protection for the intervening period before the base date of 2035 or the settlement of the final lifts in 2085.	The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Section 10.2
GULF9	Buyout/Expand	1) There are insufficient funds authorized for non –structural measures and relocation. Some areas inside the alignment should be relocated. Current relocation is disorganized.	Several commenters recommended expansion of the nonstructural plans. The USACE supports the use of nonstructural solutions as an essential part of a comprehensive hurricane and storm damage reduction program. Nonstructural measures are the responsibility of not just the Federal government, but also state and local governments and private citizens. In the original feasibility study, nonstructural alternatives, in lieu of levees, were not found to be economically justified and were therefore not authorized or re-evaluated for the PAC report. Large-scale relocation is problematic both socially and economically because homes and businesses would have to be moved considerable distances north to the Houma or Thibodaux areas to remove them from the threat of coastal flooding from the 1% AEP (100-year) storm surge event.	NA
GULF10	Buyout/Expand & State Master Plan	The 2012 Master Plan, allocates a quarter of total protection and restoration funding to “non-structural” measures within and without the levee system.	Comment noted.Several commenters recommended expansion of the nonstructural plans. The USACE supports the use of nonstructural solutions as an essential part of a comprehensive hurricane and storm damage reduction program. Nonstructural measures are the responsibility of not just the Federal government, but also state and local governments and private citizens. In the original feasibility study, nonstructural alternatives, in lieu of levees, were not found to be economically justified and were therefore not authorized or re-evaluated for the PAC report. Large-scale relocation is problematic both socially and economically because homes and businesses would have to be moved considerable distances north to the Houma or Thibodaux areas to remove them from the threat of coastal flooding from the 1% AEP (100-year) storm surge event.	NA
GULF11	Buyout/Expand & Risk	Authorization of nonstructural funds would communicate the risk of flooding in the more distal areas of the basin; Without nonstructural measures, USACE risks misleading coastal communities that they will be protected from storms.	Comment noted. Several commenters recommended expansion of the nonstructural plans. The USACE supports the use of nonstructural solutions as an essential part of a comprehensive hurricane and storm damage reduction program. Nonstructural measures are the responsibility of not just the Federal government, but also state and local governments and private citizens. In the original feasibility study, nonstructural alternatives, in lieu of levees, were not found to be economically justified and were therefore not authorized or re-evaluated for the PAC report. Large-scale relocation is problematic both socially and economically because homes and businesses would have to be moved considerable distances north to the Houma or Thibodaux areas to remove them from the threat of coastal flooding from the 1% AEP (100-year) storm surge event. The main PAC report has been updated to explain Residual Risk. Levees are only one of many steps to reduce risk. Even with the Morganza project in place, some risk of flooding remains, as well as other residual risks such as wind damage. An important step is for parish and state governments to develop evacuation plans and for individuals to heed them. USACE will continue their coordination/communication with the public and improve on the discusion disclosing potential flood risk reduction. The FRPEIS includes a description of residual flood risk and describes the specific efforts taken to ensure that flood risk in the area does not increase as a result of further development in high risk areas.	PAC Section 10.2
GULF12	Buyout & EJ	The absence of Isle de Jean Charles in the Real Estate Appendix is an error and does not give us confidence that the Executive Order on Environmental Justice (E.O. 12898) is being taken seriously.	The buyout cost for the Isle of de Jean Charles community is included in total buyout cost under the Real Estate Appendix The buyout plan is too preliminary to be included in the Real Estate Plan as detailed components. Several commenters recommended expansion of the nonstructural plans. The USACE supports the use of nonstructural solutions as an essential part of a comprehensive hurricane and storm damage reduction	NA
GULF13	Buyout/Expand	We request that funds for non-structural risk reduction be authorized within the project area, as well as relocation funds for more distal areas of the basin.	Several commenters recommended expansion of the nonstructural plans. The USACE supports the use of nonstructural solutions as an essential part of a comprehensive hurricane and storm damage reduction program. Nonstructural measures are the responsibility of not just the Federal government, but also state and local governments and private citizens. In the original feasibility study, nonstructural alternatives, in lieu of levees, were not found to be economically justified and were therefore not authorized or re-evaluated for the PAC report. Large-scale relocation is problematic both socially and economically because homes and businesses would have to be moved considerable distances north to the Houma or Thibodaux areas to remove them from the threat of coastal flooding from the 1% AEP (100-year) storm surge event.	NA

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GULF14	Economics	2) Lack of consideration of updates to the DFIRM and Biggert-Waters Reform Act of 2012. We question any population analysis that ignores the changes in federal insurance, as well as the existing intra-basin trend of population growth. We request an economic benefits analysis that includes these geographic details.	Do not concur: The statement that the PAC population and economic analysis ignores the federal insurance program and the existing intra-basin trend of population growth is false. The economic analysis of future conditions is geographically based and was adjusted to account for the behavior of property owners whose structures incur repetitive flood losses. Refer to Section 3.5 of the main PAC report and pages 23 to 29 of the Economic Appendix.	NA
GULF15	Indirect/Ring Levees	3) Lack of consideration of existing and future ring levees...this RPEIS does not consider the environmental impact of the other existing and proposed levees necessitated by flood risk reduction.	Do not concur: There will be no change with and without project due to enclosed ring levees. These impacts do not change. Existing and new ring levees inside the system could allow for the system to remain open longer in the future as there is a change in sea level.	NA
GULF16	Indirect/Ring Levees	We argue that these ring levees, which in places rise to the heights of the first lift of the Morganza project, are a de-facto Alternative 3 (MLODS) being built in addition to the preferred alternative, and so these damages to habitat are proposed in addition to the damages of the preferred alignment.	Comment noted	NA
GULF17	Realign/MLODS	Although many modifications of the preferred alternative have been made to adjust for impacts, the same rigor has not been applied to Alternative 3.	The MLODS alternative was a preliminary alternative that was not carried forward and evaluated to the same level of detail as the other two alternatives along the authorized alignment. As described in section 4 of the PAC report, the MLODS alternative was screened out because it would cause more induced flooding and have less internal storage in the case of overtopping (higher residual risk).There is also a greater impact on BLH that has a higher mitigation cost compared to impacts to marsh.	NA
GULF18	Indirect/Ring Levees & Realign/MLODS	We request that the full levee system, including ring levees, within the project area be evaluated for environmental impacts. We request a full analysis of Alternative 3 based upon the ring levees proposed for the area.	Do not concur: There will be no change with and without project due to enclosed ring levees. These impacts do not change. Existing and new ring levees inside the system could allow for the system to remain open longer in the future as there is a change in sea level.The MLODS alternative was a preliminary alternative that was not carried forward and evaluated to the same level of detail as the other two alternatives along the authorized alignment. As described in section 4 of the PAC report, the MLODS alternative was screened out because it would cause more induced flooding and have less internal storage in the case of overtopping (higher residual risk).There is also a greater impact on BLH that has a higher mitigation cost compared to impacts to marsh.	NA
GULF19	Mitigate	4) Mitigation of public lands should take place within the bounds of public lands....damages to what few public areas exist are damages to public recreation and aesthetic enjoyment.	Mitigation will be sited following all applicable laws, regulations, and policies to the greatest degree practicable.	RPEIS, Section 6.19; Appendix K
GULF20	Mitigate	We request that mitigation for Mandalay NWR and Point Aux Chenes WMA occur within the bounds and management of those areas...Both areas have been heavily impacted by legacy oil and gas activity. Mandalay has more potential for the backfilling of inactive oil and gas canals, and flotant marsh restoration; Point Aux Chenes WMA is heavily impacted by industry to the point that marsh creation with outside sediments must occur for restoration. Restoration of both of these areas would provide flood risk reduction to communities within the project area, as well as reduce the likelihood of damage from regular storm fronts to the project structures themselves, lowering maintenance costs.	Coordination with USFWS will continue to occur when determining the impact to and the mitigation requirements for impacts on the NWR per response to USFWS #13. Similar coordination will continue with LADWF regarding impacts on the WMA and mitigation of these impacts. Mitigation plans for unavoidable impacts to the NWR and the WMA will be addressed in future supplemental NEPA documents.	RPEIS, Section 6.19; Appendix K
GULF21	Mitigate	5) The levee system should be mitigated for with the most current mitigation standard...We request that the highest mitigation standard be applied to this public project, and that floodside mitigation be included at every possibility.	Mitigation will be conducted following all applicable laws, regulations, and policies to the greatest degree practicable.	RPEIS, Section 6.19; Appendix K
GULF22	Realign/MLODS	It is troubling that this misunderstanding of coastal processes is reflected in the fact that this preferred alignment for the Morganza to the Gulf levee follows the footprint of several failed “marsh management” structures.	Comment Noted	NA
BASIN1	Eco Proj	Tthe Convey Atchafalaya River Water to Northern Terrebonne Marshes project is among three LCA projects that the state Coastal Restoration & Protection Authority (CPRA) notified the Corps “that it desires to suspend study and design” for, in letters of August and October, 2012. (RPEIS, p. 3-18) The RPEIS states that this decision “results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA).” Fuller explanation is warranted.	The project was designed to not interfere with existing and proposed ecosystem restoration projects. Use of the GIWW to divert freshwater is not a component of the Morganza project, but is a component of the LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project. The LCA Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock project is authorized by Congress and therefore should be considered as part of the future without and future with project conditions. The reason that the State requested that the LCA projects be put on hold was not based on the Morganza to the Gulf project. There was no determination by the State that the project would interfere with the LCA projects. In addition, a project similar to the LCA project is included in the State 2012 Master Plan. Furthermore, funding from the recent Deepwater Horizon oil spill fines will be released to impacted states, including Louisiana, for ecosystem restoration efforts. Hence, the authorized LCA project is a reasonably foreseeable project and should be addressed in both the future without and future with project conditons.	NA
BASIN2	sediment management	The EIS failed to address the way that the Corps of Engineers currently manages sediments.	Comment Noted	NA
BASIN3	Eco Proj	Consistency of the proposed alignment with CWPPRA is an important issue that is not addressed.	The plan formulation for the proposed alignment has considered potential impacts and interactions with CWPPRA, LCA and other existing and authorized projects. The plan formulation included avoiding as well as working synergistically with other projects.	NA
BASIN4	RLSR	With a predicted sea level rise of 2.4 feet and possibly 4.8 feet by 2085, it is a poor investment and little more than a short-term solution to build a levee through what soon will be open water.	Comment noted	NA
BASIN5	Indirect/Sediment	The Morganza to the Gulf levee will most likely increase the speed of coastal erosion by blocking sediments from moving through the system and increasing storm surge levels south of the levee.	Several NGOs noted that regular tidal fronts can deposit sediment into connected coastal marshes and stressed the importance of leaving estuarine systems open to maintain a sustainable ecosystem. They also noted that the Morganza to the Gulf levee could increase the speed of coastal erosion by blocking sediments from moving through the system. The Habitat Evaluation Team discussed these assumptions and concluded that although the project would prevent some sediment deposition (a potential negative indirect effect of the project), the levees could also prevent surge and waves from destroying interior wetlands (a potential positive indirect effect). USFWS noted that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise. Since the net effect of sediment deposition impacts with the project compared to without the project (no action) is unknown and highly speculative, the Habitat Evaluation Team agreed that it should not been quantified for the indirect impacts analysis at this time, but rather, discussed qualitatively in the Final RPEIS.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
BASIN6	Buyout/Expand	The study fails to address the comparison of the benefits of the project against the long term benefits of implementing a project that would have lasting effects to the aid or present and future generations. The $12.9 billion may be better spent to fund an orderly retreat from the coast.	Comment noted	NA
BASIN7	Eco Proj	Open Bayou Lafourche; close HNC; divert some Atch River water to combat coastal erosion & RSLR.	Comment noted	NA
BASIN8	Buyout/Expand	The fact that the population for the project area is expected to increase overall reflects the negligent handling by the State of Louisiana of the crisis of rising water levels and increased frequency and intensity of flooding. The State of Louisiana should be working to depopulate the area and discourage further development along the coast.	Comment noted	NA
BASIN9	Indirect/Ring Levees	The EIS should include the cumulative impacts, including several ring levees that have been permitted through the 404 process in the area north of Lake Boudreaux. Habitat damages caused by ring levees should be considered in addition to the negative impacts caused by the preferred alignment.	Do not concur: There will be no change with and without project due to enclosed ring levees. These impacts do not change. Existing and new ring levees inside the system could allow for the system to remain open longer in the future as there is a change in sea level.	NA
SIERRA1	Borrow & Indirect & NEPA Piecemeal	The Delta Chapter agrees with the US Fish and Wildlife Service--indirect impact assessments are incomplete and direct construction impacts are only programmic assessment level. Eg., borrow sites have not been selected for all segments. The Final PEIS will also be incomplete. The NEPA process is piecemeal and cumulative affects are not being addressed.	This is a programatic NEPA Document and as such all details are not required. Borrow sites have been identified for the constructible features (levee reaches F-1, F-2, and G-1; the HNC lock complex; and the Bayou Grand Caillou floodgate). For the remaining programmatic features, additional NEPA documents will address borrow site impacts once borrow sites are identified. Additional information will be provided to better demonstrate selection of the least environmentally damaging borrow sources. Additional discussion of the avoidance of jurisdictional wetlands will also be included.	RPEIS Section 3.5.3; 6.2

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SIERRA2	Indirect	We do criticize the inclusion of over 80,000 acres (125 sq mi) of wetlands within the federal "leaky" levee system. First, the wetlands will be isolated from storm surges which carry suspended sediments. We request that the Corps and other agencies look at this process before agreeing to enclose and isolate 80,000 acres of wetlands. What are the environmental costs if these marshes are lost to productivity?	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA3	Indirect/gate closures	Second, the isolation of the wetlands over time will reduce the fisheries productivity in Terrebonne Parish.	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA4	Indirect/gate closures	Will the number of culverts and navigational openings be sufficient over the 50 year life of the project to assure ingress and egress of fisheries species?	Several commenters expressed concern about enclosing wetlands behind the proposed Federal levee and asked to see an estimate of the enclosed wetlands acreage included in the Final RPEIS. Approximately 68,000 acres of marsh are located behind the proposed Federal levees. Of those 68,000 acres, a little over 46,000 acres of marsh are within the indirect impacts area for the constructible features. The constructible features consist of the Houma Navigation Canal lock complex, the Bayou Grand Caillou floodgate, and levee reaches F and G-1. Approximately 84 of the 98 miles of proposed Federal levee, or 86% of the levee alignment, follow existing hydrologic barriers. Within the remaining 14 miles of levee, which cross areas currently open to tidal exchange, environmental control structures (box culverts with sluice gates) would be constructed to allow continued tidal exchange and ingress/egress of fisheries species. The Final PAC and RPEIS notes that there is a potential for significant adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future. The potential impacts that would be attributable to the proposed Federal levees are unknown at this time because they would be dependent on the amount of wetland loss due to relative sea level rise and hurricanes independent of the project, as well as any changes resulting from the project being constructed by the State of Louisiana and Terrebonne Levee and Conservation District which follows the alignment of the proposed Federal project. Culvert sizes, and numbers where looked at to maintain the required velocities for aquatic organisms with the coordination of the resource agencies. It will be reevaluated in PED and will be documented in supplemental NEPA documents.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA5	Hydrology impacts	Will the openings compensate for the elimination of sheet flow?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA6	Hydrology impacts	Third, we also have concerns about sustainability of culverts which will cross under the levees. Because of high subsidence rates where the levees cross marshes (especially Reaches J, K, L), how will the Corps assure that water circulation will be maintained as these levee segments subside?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA
SIERRA7	RSLR	Will the culverts be built on pilings? How will the cross sectional areas be maintained over the life of the project? As RSL increases, how will this affect the movement of water through the culverts over the life of the project?	All the structures are pile founded. Maintenance of the cross sections area would be included in the O&M Manual for the project and would include clearing of debris and sedimentation inside the culverts and in the immediate vicinity to ensure the required cross section is available for flow.	NA

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SIERRA8	Indirect/gate closures	As a result of hi RSLR, if the system must remain closed for even 24 days per year, what affect will this have on fisheries? If the closure comes at critical times for migrating fisheries how will this affect the productivity of the Terrebonne marshes? 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 problem if less wetlands were included within the levee system as recommended in MLOD (Alt 3).	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.1; 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA9	Direct	Does the levee footprint include: 1) the width of the borrow canal? 2) the offset between the berm and the borrow canal? 3) A 50 ft buffer zone from toe of slope? The entire impacted footprint of each levee section must be included as part of the direct impacts and wetland losses.	The term "levee footprint" refers only the toe-to-toe width of the levee itself. The direct impacts and wetland losses are calculated based on the Right-of-Way limits (include the levee footprint, the borrow canal and the widths of the offsets required for both levee stability and borrow pit stability) plus the extents of the proposed mitigation areas. The Right-of-Way limits and proposed mitigation areas are depicted in Mapbook Appendix for the Draft Revised Programmatic EIS.	RPEIS Appendix G
SIERRA10	Indirect/Enclosed	Each Alternative alignment presented in the PAC report should include the total number of wetland acres enclosed by each levee system. The report does not include this information.	Do not concur: Only two action alternatives are brought forward to the final array and they lay on the same alignment. The enclosed wetlands are provided for that alignment.	NA
SIERRA11	Mitigate	We do not accept the Corps' concept of mitigation. There is no net gain. The remaining canal will be a permanent disruption to the environment. Will the linear canals be a benefit or detriment to the ecosystem? This must be discussed in the final report.	comment noted	RPEIS, Section 6.19; Appendix K
SIERRA12	Mitigate	We are also concerned that the project could stimulate additional clearing of bottomland hardwoods for agriculture. These indirect impacts also need to be mitigated.	The future development of any jurisdictional wetland would continue to be managed by the 404 permit process. No additional lands would be put under pump by this project so the conversion of BLH to agricultural land is not expected.	RPEIS, Section 6.19; Appendix K
SIERRA13	Mitigate	The Sierra Club policy strongly recommends that the mitigation sites be implemented/completed to a point where reasonable assurance of success has been established before the levee project may commence.	Do not concur. Current guidance and law requires concurrent mitigation.	RPEIS, Section 6.19; Appendix K
SIERRA14	Mitigate	The objective of a mitigation plan should be the long-term and incremental gain in a comprehensive range of wetland values, through at least a 2:1 replacement of acreage of the disturbed wetland.	Do not concur. Current guidance and law requires the mitigation of 1:1 habitat value not acres.	RPEIS, Section 6.19; Appendix K
SIERRA15	Indirect/gate closures & Hydrology Impacts	If the gates are closed because of RSLR and the wetlands are isolated from the GOM, how will this be an enhancement? It should be included in cumulative impacts study. The disruption of sheet flow is also an environmental impact. Does the Corps know how to manage a "leaky" levee over the 50 life of the project?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.2; 6.18; 6.19; Appendix F and K

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SIERRA16	Indirect	Planned and on-going measures along with 1% AEP Alternative measures will likely be beneficial to the ecosystem and to recreation resources in numerous ways as habitat for various stages in the life-cycles of fish and wildlife are stabilized, protected, improved, and expanded. Improved fish habitat will increase the numbers and variety of fish, which will be beneficial to recreational fishing. (USACE 2013d, p. 6-49).	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA17	Indirect	The above statement is not supported by the document. It is speculative and is counter to other statements made in the PAC and DRPEIS. Eliminating sheetflow will negatively affect fisheries. Fish may have higher velocities than natural to move between protected and unprotected sides of levees. Has this been discussed with resource agencies: Will critical velocities be maintained for water flow thru culverts and other structures over the project life?	A more rigorous indirect and cumulative impacts assessment for wetland impacts was conducted and coordinated with the Habitat Evaluation Team (HET) for documentation in the FRPEIS and prior to signing the ROD. See major points below: (a) The statements in the Draft RPEIS that there are "no indirect impacts" were removed from the Final RPEIS. (b) The following statement were added to the summary report and Final PAC/RPEIS under Unresolved Issues: "There is a potential for adverse indirect and cumulative impacts to wetlands, fisheries, water quality, and navigation due to increased frequency and duration of water control structure closures in the future." (c) The refined impacts analysis was coordinated with the interagency Habitat Evaluation Team (HET) . (d) In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" was added to the Final RPEIS. (e) The potential adverse environmental and socioeconomic impacts of increased structure closure was assessed in greater detail. The Final RPEIS clarifies that there are both positive and negative impacts of the levee and that the net effect is uncertain (there are both known and unknown outcomes). (f) The potential project-induced environmental consequences to significant resources was more thoroughly documented to include not only magnitude of potential changes, but also the extent (how vast is the potential changes), direction (how dynamic is the potential changes), duration of potential changes, and speed of potential changes. (g) The Final RPEIS includes a more detailed description of the analysis of potential project-induced net indirect impacts including consideration of the potential for negative effects in the future. These potential negative effects of the levee system was compared to the potential near-term environmental effects to more fully disclose all significant potential indirect effects to the human and natural environment. (h) During PED, additional environmental plan formulation would be conducted to develop specific design features, implementation procedures, and operational schemes which would focus on ways to better avoid, minimize, and reduce potential adverse indirect impacts to aquatic resources enclosed within the proposed levee system. (i) For the PROGRAMMATIC features, a qualitative analysis of indirect and cumulative impacts was added to the Final RPEIS. The Final RPEIS better explains the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc) in the Risk and Uncertainty Section. EIS describes what the adverse impacts to each of these resources could be under different sea level rise scenarios. For example, the cumulative effects on the aquatic organisms section will be revised to clarify not only the short-term but also the long-term cumulative impacts of how the projections regarding future frequency of gate and structure closure would potentially impact the aquatic ecosystem. Re-analysis considers the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. (j) For the CONSTRUCTIBLE features, the HET ran full WVAs for 4 scenarios to provide a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future, i.e. almost year round closure by 2085 (4) High RSLR & more frequent closure in the future, i.e. full closure by 2085. (k) Currently, the systemwide model cannot address RSLR. If the project is re-authorized, additional systemwide modeling could be conducted to quantify RSLR impacts. (l) The operation plans were clarified, impact analyses, and associated conclusions in the RPEIS are preliminary and subject to change based on pending additional modeling results.	RPEIS, Summary; Section 3.5.3; 6.18; 6.19; Appendix F and K
SIERRA18	HSDRRS/support	The Delta Chapter of the Sierra Club strongly supports using post-Katrina engineering design criteria-especially the new soil standards-- into the federal levees.	The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	NA
SIERRA19	Geotech & HSDRRS/support	Proper soil borings with adequate spacing must be taken through all the local levees to be included in the federal system. The material incorporated into these local levees must meet the post-Katrina Federal standards for earthen levees.	The number/location of soil borings is sufficient for a feasibility level study. If the project is re-authorized, additional borings would be taken during PreConstruction Engineering and Design (PED).	NA

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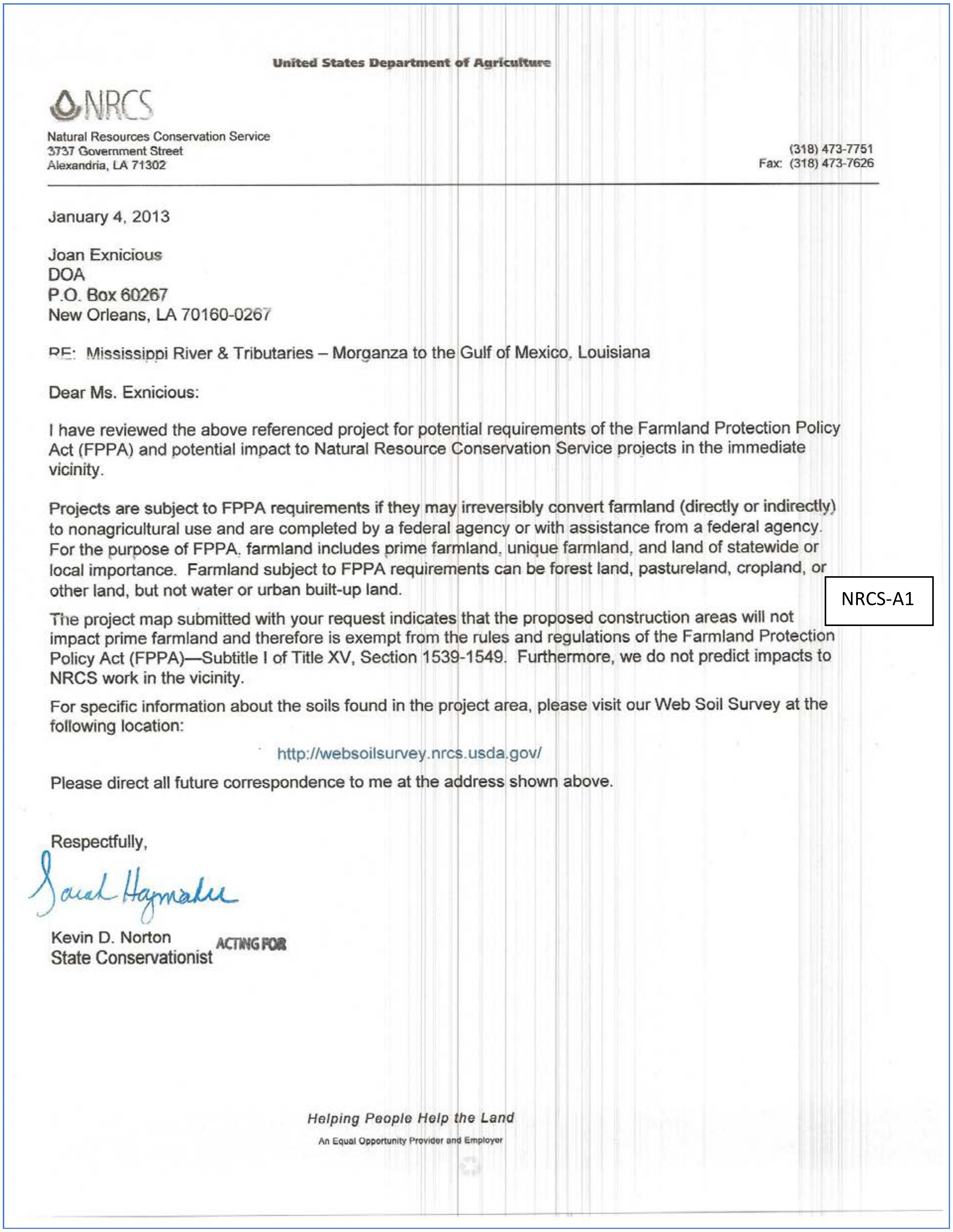
			The Draft PAC report reflects cost estimates based on a project designed using the Hurricane and Storm Damage Risk Reduction System (HSDRRS) guidelines. These peer-reviewed guidelines were developed in response to recommendations made by the Interagency Performance Evalaution Task force (IPET), a team composed of members from USACE, industry and academia that evaluated the Greater New Orleans levee system after Hurricane Katrina. The Assistant Secretary of the Army (Civil Works) has directed that USACE apply the HSDRRS guidelines to all hurricane and coastal storm system work in Louisiana, including the Morganza to the Gulf PAC project. Comments were received both supporting the use of the HSDRRS criteria, and suggesting adaptation of some of the HSDRRS criteria for the site specific characteristics of the Morganza to the Gulf project area. Parallel to the PAC analysis, the USACE Risk Management Center and New Orleans District jointly evaluated the proposed Morganza to the Gulf levee system and concluded that site adapting three specific HSDRRS criteria could significantly reduce project costs while producing only minimal changes in potential consequences. A section on site adapting the HSDRRS standards has been added to the main PAC report, including a recommendation to change Factor of Safety for end of construction global stability, change the Design Overtopping Rate for well-maintained grass covered levee slopes, and eliminate the structural superiority requirement. If these changes are approved, modifications would be made to designs and costs during the next phase of implementation, Pre-construction Engineering and Design (PED). The USACE is also conducting a national-level risk assessment to ensure risk is addressed consistently across the country.	NA
SUND1	Realign/Private Landowner	Alligator farm cut in half by proposed alignment.	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA
WILL1	Contracts	Incorporate into contract documents: "The owner of this project encourages and supports minority and local worker and contractor participation at all levels therein."	The socioeconomic program requirements for Federal acquisitions are contained in Federal Acquisition Regulation (FAR) Part 19 which can be found at www.acquisition.gov/far/. The agency fully supports the goals of these programs and will implement them in any future acquisitions under this project; to the extent they are consistent with the needs of the agency.	NA
THIB1	Real estate	Extension to modified alignment close to LA182 in Gibson; landowners unlikely to agree to forfeit ownership for levee construction.	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA
LAMB1	Support	Project is essential to survival of bayou communities	Comment noted.	NA
CHAU1	Support	Houma area has changed over the past 75 years; Houma needs protection; something is better than nothing; if nothing done all the land will be gone; congressional action needed.	Comment noted.	NA
SPEA1	Support, Cost/too high, time	Cost too high; takes too long to get authorized; What is the role of citizens in getting the project authorized?	Once the chief of engineer's signs the chief's report and it gets presented to Congress, if you so choose, just like any other issue that you like to advocate for ,you can call your congressman or senator, go visit them.	NA
TEMP1	Outreach	More public notice and outreach needed.	In addition to finding out about public documents and meetings in local newspapers, on the Corps website, and on social media sites, interested parties can be added to a mailing list and receive notices on anything the Corps does in the parish for those environmental documents.	NA
TEMP2	Support & outreach	Was there any public input into selection of the 1% AEP alternative?	The 1% AEP alterantive was tentatively selected because it has higher net benefits than the 3% AEP alternative. The public had the opportunity to review this selection and comment on it during the Draft RPEIS public review period (January 4 - February 19, 2013). There have been several previous meetings also that were open to the public.	NA
DARD1	Support	Some protection better than none, but people are being left out of the protection.	Comment noted.	NA
DARD2	B/C of Cultural	Benefit-cost ratio doesn't consider cultural importance; less funding for LA than NY/NJ.	The benefit-to-cost ratio is used to measure the ability of the proposed project to reduce primarily physical damages and other economic losses that are otherwise attributable to storm surge. The benefit-to-cost ratio is not used to capture important social attributes such as community cohesion and cultural heritage which can be positively or negatively affected by the project.	NA
DARD3	Realign/Lower Dularge	Wants existing floodgate at Lower DuLarge incorporated into the project to protect more people	Lower Dularge area was not included in the project authorized in WRDA 2007 and is not part of the recommended plan in the 2013 Post Authorization Change (PAC) Report. Options for pursuing a Federal flood risk reduction system for this area include: (a) For projects with construction costs of $7M or less, a flood risk reduction system could be investigated under the Corps CAP (Continuing Authorities Program) project authority. (b) Congress could direct the Corps to incorporate Lower Dularge into the Morganza to the Gulf project area. (c) The Corps and the Non-Federal sponsor could agree to investigate a Locally Preferred Plan (LPP) in a future Morganza to the Gulf Post Authorization Change (PAC) report that would extend the levee alignment to include lower Dularge. In order for an LPP to be recommended, the LPP must be economically justified (BCR greater than 1.0) and any difference (increase) in construction cost must be funded 100% by the Non-Federal sponsor.	NA
DARD4	Outreach	Wants more follow up to stay informed throughout the process, not just during the public meeting; need more advanced notice of public meetings; some people don't have access to the internet.	In addition to finding out about public documents and meetings in local newspapers, on the Corps website, and on social media sites, interested parties can be added to a mailing list and receive notices on anything the Corps does in the parish for those environmental documents.	RPEIS Section 9
HALE2	Realign/Private Landowner	Levee alignment impacts future development; is the levee alignment set in stone?	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA
PITR1	Question/Clarification	Had to move out of family home up the bayou; how far north does the project area go?	All of Terrebonne Parish and the portion of Lafourche Parish south of Bayou Lafourche is included in the project area.	NA
PITR2	Pipelines	Are pipeline relocations included in the project cost?	The cost to relocate pipelines and other utilities is included in the total project cost.	NA
PITR3	Pipelines	How will the pipeline owners participate in the relocation costs?	There is a process to determine whether pipeline relocations are compensable (paid for by the Federal government) or non-compensable (paid for by the pipeline or utility owner).	NA
LPC2	Realign/Gheens	Wants Gheens included (was misspelled as Gaines in the public meeting summary)	The MLODS alternative was a preliminary alternative that was not carried forward and evaluated to the same level of detail as the other two alternatives along the authorized alignment. As described in section 4 of the PAC report, the MLODS alternative was screened out because it would cause more induced flooding and have less internal storage in the case of overtopping (higher residual risk).There is also a greater impact on BLH that has a higher mitigation cost compared to impacts to marsh.	NA
OSTH2	Realign/Private Landowner	Some of his property is inside the alignment; some is outside. He also submitted a formal comment.	Just as the PAC alignment was re-evaluated and changes were made to some levee reaches after the original authorization (as described in section 5 of the PAC report), if the Morganza to the Gulf project is reauthorized, each levee reach alignment would be re-evaluated in more detail during the Preconstruction Engineering and Design (PED) phase. If real estate rights are purchased for levee construction, the government would offer market value of the property to be acquired. All acquisitions would be performed in accordance with the terms of P.L. 91-646.	NA
ARMO1	Support	Expresses support for the project	Comment noted.	NA

Unique Identifier**	Theme(s)	Comment (may be paraphrased or summarized)	Final Response	Comment Addressed in Section of PAC or EIS
ROSE1	Question/Clarification	Can Corps stop or delay the local parish levee district from building the Morganza project?	The Corps supports the local construction effort; since the local construction effort currently has no Federal funding, there is no reason why the Corps would intervene. TLCD would continue to get permits as needed.	NA
USCG1		The current plans to construct navigation openings in the flood control system, specifically structures across the Gulflntracoastal Waterway (GIWW) and Houma Navigation Canal (HNC), call for an opening of only 125 feet. Based on historical bridge and lock allision data along the GIWW, we believe that these gate openings are inevitably susceptible to damage from contact by vessel traffic. Further, we advocate consistency in gate openings crossing the GIWW system. For example, the nearby GIWW West Closure project maintains a 225 foot opening which we feel is appropriate to address navigational safety and accommodate the trend oflarger towing vessels transiting the waterway.	If the project is reauthorized, a physical model or ship simulator model would be done in PED to ensure that the gate design would also for safe navigation. Additional modeling to determine second order economic impacts could also be conducted as suggested with more recent data and stakeholder involvement during the PED and would be documented in the Supplemental NEPA document for the Gates.	NA
USCG2		A second concern is the manner in which the flood protection walls are required to be shut during a flooding event. We request that a written plan be created to define specific criteria for closure to allow adequate planning for vessels entering or departing the area to seek refuge. Operation of the West Closure Complex gates will also need to be taken into consideration when closing the gates proposed by this project. The Coast Guard is not in a position to manage or enforce removal of vessels from the entire flood control project as is currently being done in the New Orleans hurricane and storm damage risk reduction system project.	The Morganza to Gulf PAC Report is a feasibility-level report, reflecting preliminary designs, preliminary costs and preliminary operating scenarios. Should the project be reauthorized and funded, more detailed information will be obtained during the Pre-Construction Engineering and Design (PED) phase and Construction phase and used to refine the information presented in the PAC Report. At that time, the Corps would work closely with other state and Federal agencies, including the Coast Guard, to develop detailed operations plans for each of the navigable structures. The PAC Report does not include plans, designs or costs to construct any floodwalls along any navigable waterways. The proposed project features are not expected to create any Regulated Navigation Areas that would require Coast Guard enforcement.	NA
USCG3		Finally, the Coast Guard understands that the USACE position is that ownership and operation of the flood gates should remain in control of a federal agency. The Coast Guard supports this position. The Coast Guard also believes this is necessary to facilitate commerce and vessel movement until it becomes absolutely necessary to close the gates for their intended purpose.	Comment appreciated	NA

Agency Comments



United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3737 Government Street
Alexandria, LA 71302

(318) 473-7751
Fax: (318) 473-7626

January 4, 2013

Joan Exnicious
DOA
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Mississippi River & Tributaries – Morganza to the Gulf of Mexico, Louisiana

Dear Ms. Exnicious:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resource 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.

NRCS-A1

The project map submitted with your request indicates that the proposed construction areas will not impact prime farmland and therefore is exempt from the rules and regulations of the Farmland Protection Policy Act (FPPA)—Subtitle I of Title XV, Section 1539-1549. 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/

Please direct all future correspondence to me at the address shown above.

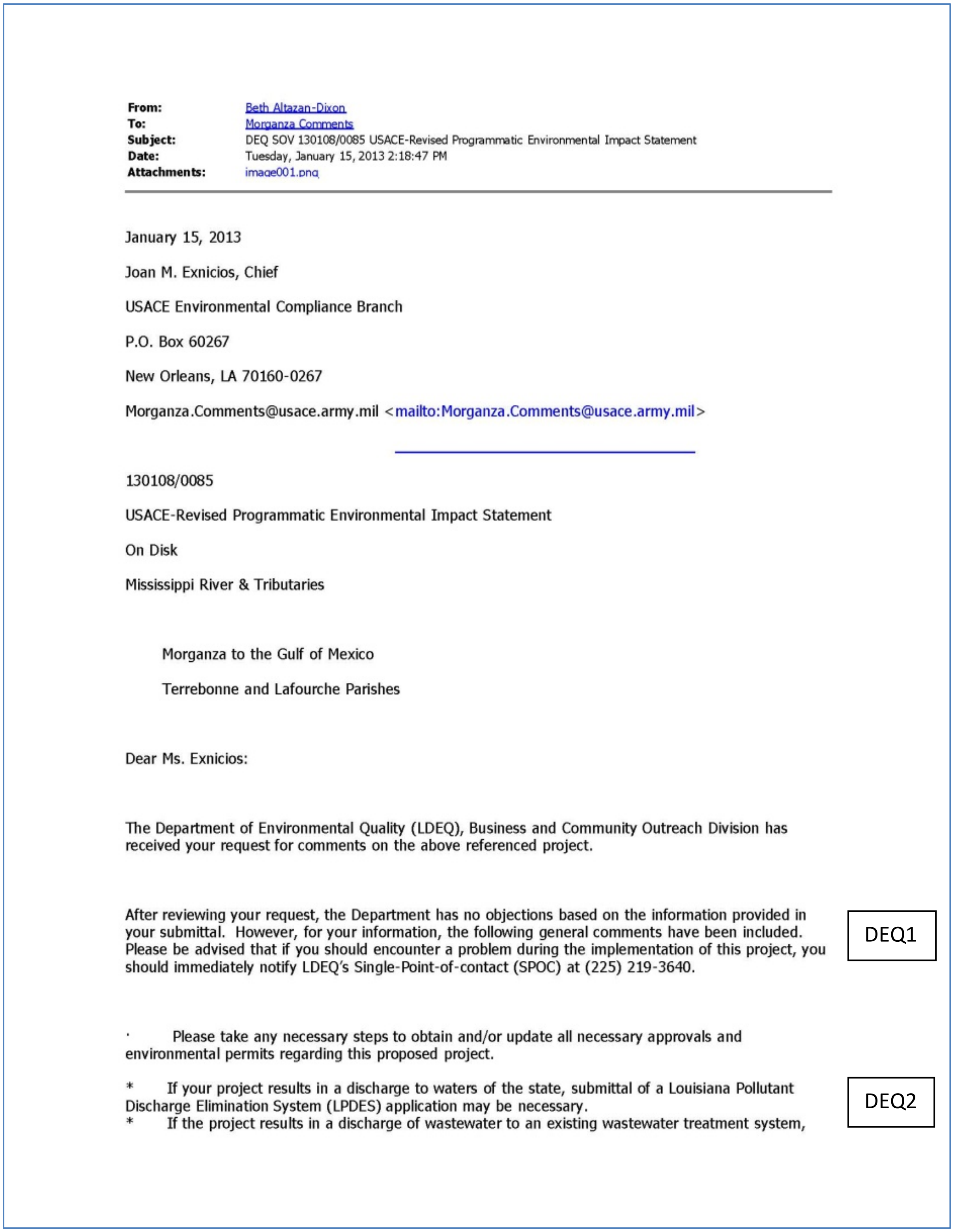
Respectfully,

Sarah Haymaker

Kevin D. Norton ACTING FOR
State Conservationist

Helping People Help the Land

An Equal Opportunity Provider and Employer



From: Beth Altazan-Dixon
To: Morganza Comments
Subject: DEQ SOV 130108/0085 USACE-Revised Programmatic Environmental Impact Statement
Date: Tuesday, January 15, 2013 2:18:47 PM
Attachments: image001.png

January 15, 2013

Joan M. Exnicios, Chief

USACE Environmental Compliance Branch

P.O. Box 60267

New Orleans, LA 70160-0267

Morganza.Comments@usace.army.mil <mailto:Morganza.Comments@usace.army.mil>

130108/0085

USACE-Revised Programmatic Environmental Impact Statement

On Disk

Mississippi River & Tributaries

Morganza to the Gulf of Mexico

Terrebonne and Lafourche 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.

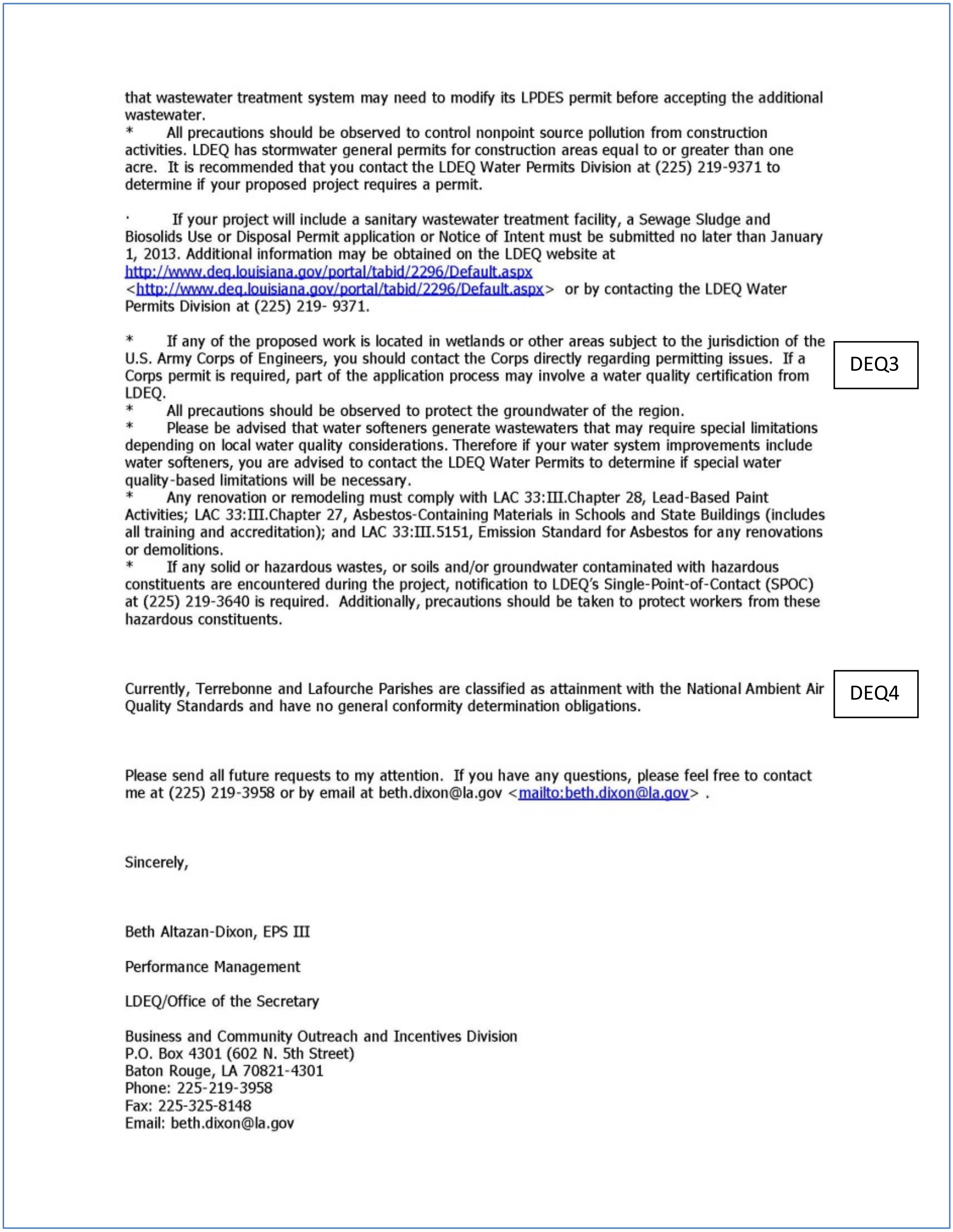
DEQ1

· 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.

DEQ2

* 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 must be submitted no later than January 1, 2013. 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.

DEQ3

* 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, Terrebonne and Lafourche Parishes are classified as attainment with the National Ambient Air Quality Standards and have no general conformity determination obligations.

DEQ4

Please send all future requests to my attention. If you have any questions, please feel free to contact me at (225) 219-3958 or by email at beth.dixon@la.gov <mailto:beth.dixon@la.gov> .

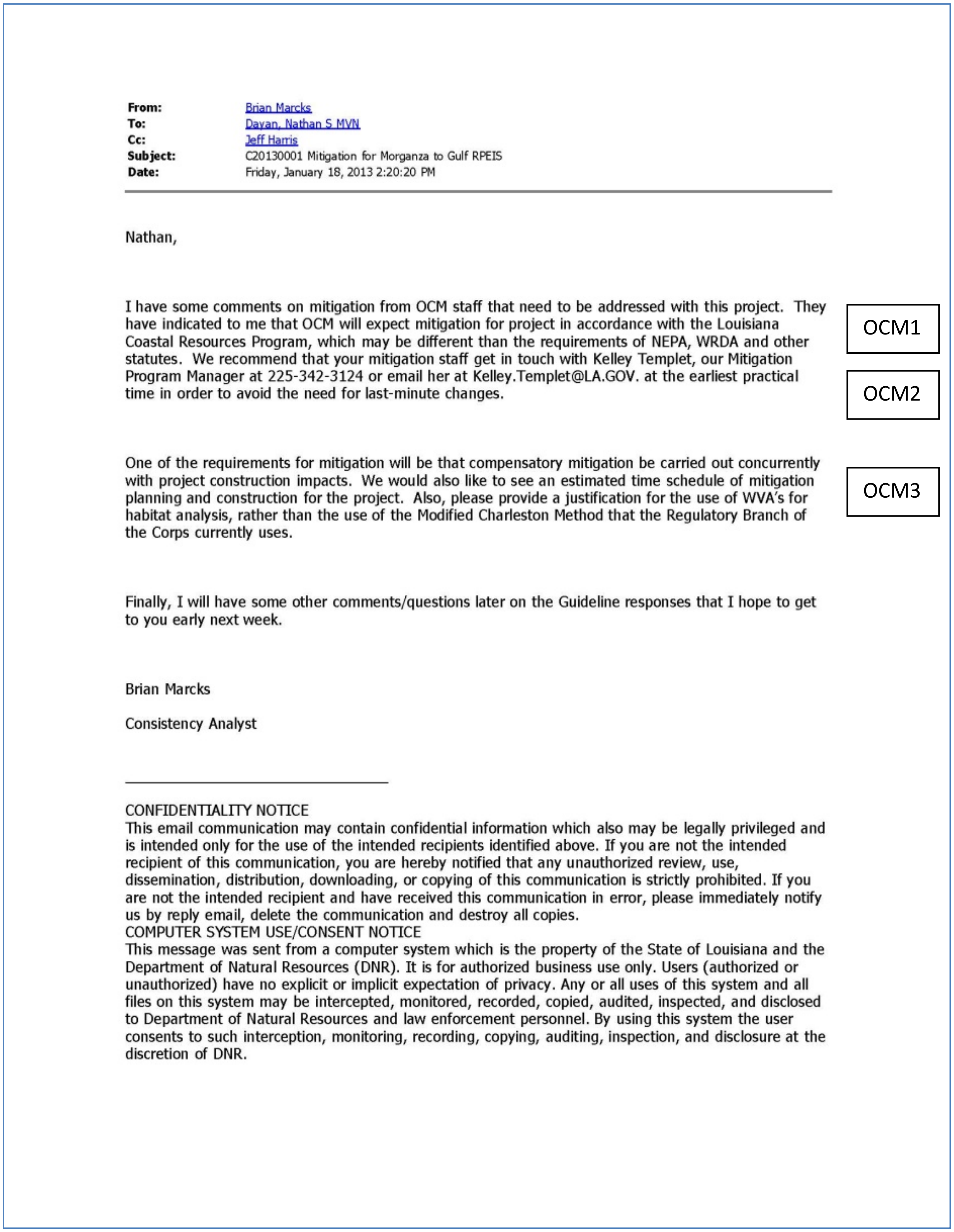
Sincerely,

Beth Altazan-Dixon, EPS III

Performance Management

LDEQ/Office of the Secretary

Business and Community Outreach and Incentives Division
P.O. Box 4301 (602 N. 5th Street)
Baton Rouge, LA 70821-4301
Phone: 225-219-3958
Fax: 225-325-8148
Email: beth.dixon@la.gov



From: Brian Marcks
To: Dayan, Nathan S MVN
Cc: Jeff Harris
Subject: C20130001 Mitigation for Morganza to Gulf RPEIS
Date: Friday, January 18, 2013 2:20:20 PM

Nathan,

I have some comments on mitigation from OCM staff that need to be addressed with this project. They have indicated to me that OCM will expect mitigation for project in accordance with the Louisiana Coastal Resources Program, which may be different than the requirements of NEPA, WRDA and other statutes. We recommend that your mitigation staff get in touch with Kelley Templet, our Mitigation Program Manager at 225-342-3124 or email her at Kelley.Templet@LA.GOV. at the earliest practical time in order to avoid the need for last-minute changes.

OCM1

OCM2

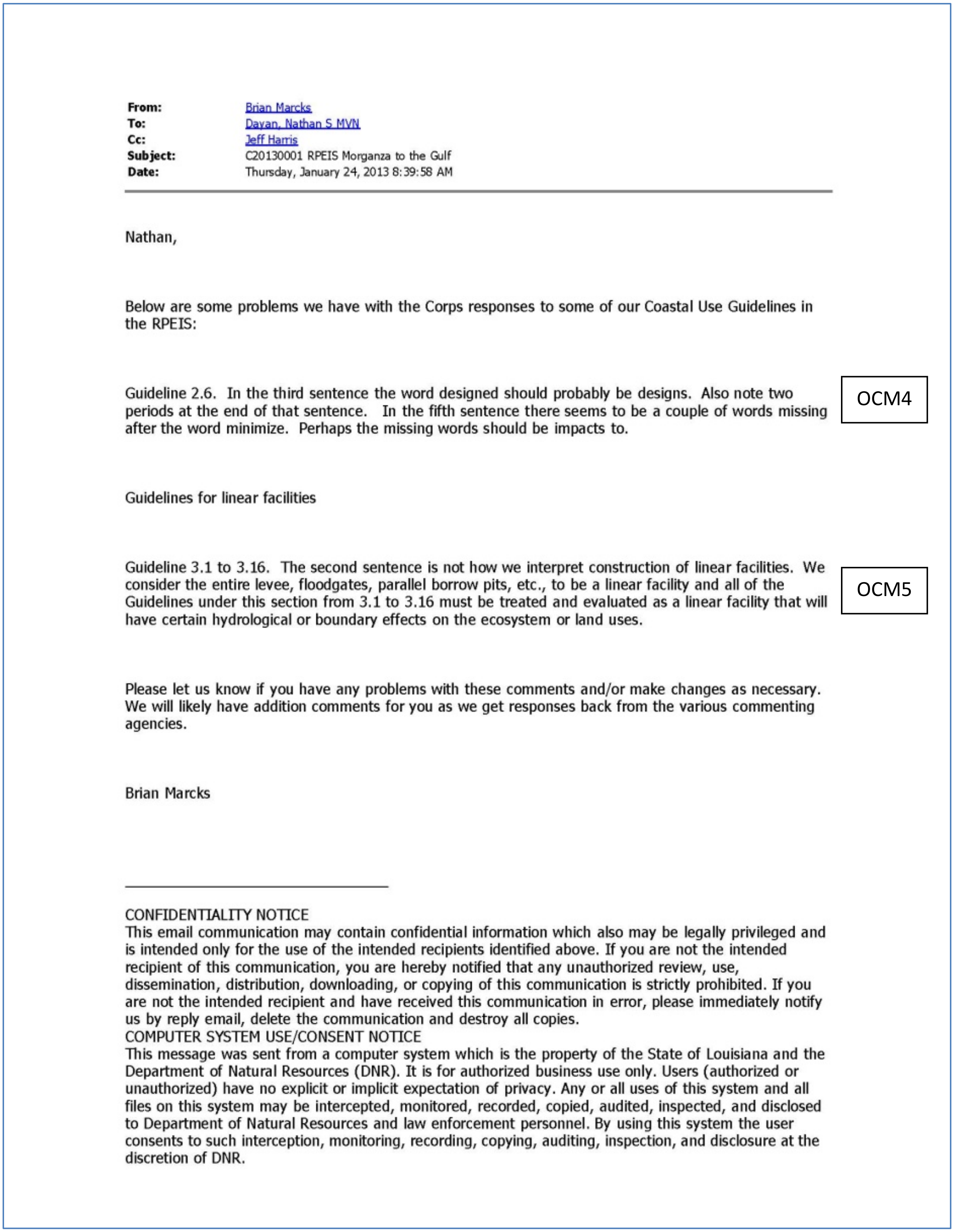
One of the requirements for mitigation will be that compensatory mitigation be carried out concurrently with project construction impacts. We would also like to see an estimated time schedule of mitigation planning and construction for the project. Also, please provide a justification for the use of WVA's for habitat analysis, rather than the use of the Modified Charleston Method that the Regulatory Branch of the Corps currently uses.

OCM3

Finally, I will have some other comments/questions later on the Guideline responses that I hope to get to you early next week.

Brian Marcks

Consistency Analyst



From: Brian Marcks
To: Dayan, Nathan S MVN
Cc: Jeff Harris
Subject: C20130001 RPEIS Morganza to the Gulf
Date: Thursday, January 24, 2013 8:39:58 AM

Nathan,

Below are some problems we have with the Corps responses to some of our Coastal Use Guidelines in the RPEIS:

Guideline 2.6. In the third sentence the word designed should probably be designs. Also note two periods at the end of that sentence. In the fifth sentence there seems to be a couple of words missing after the word minimize. Perhaps the missing words should be impacts to.

OCM4

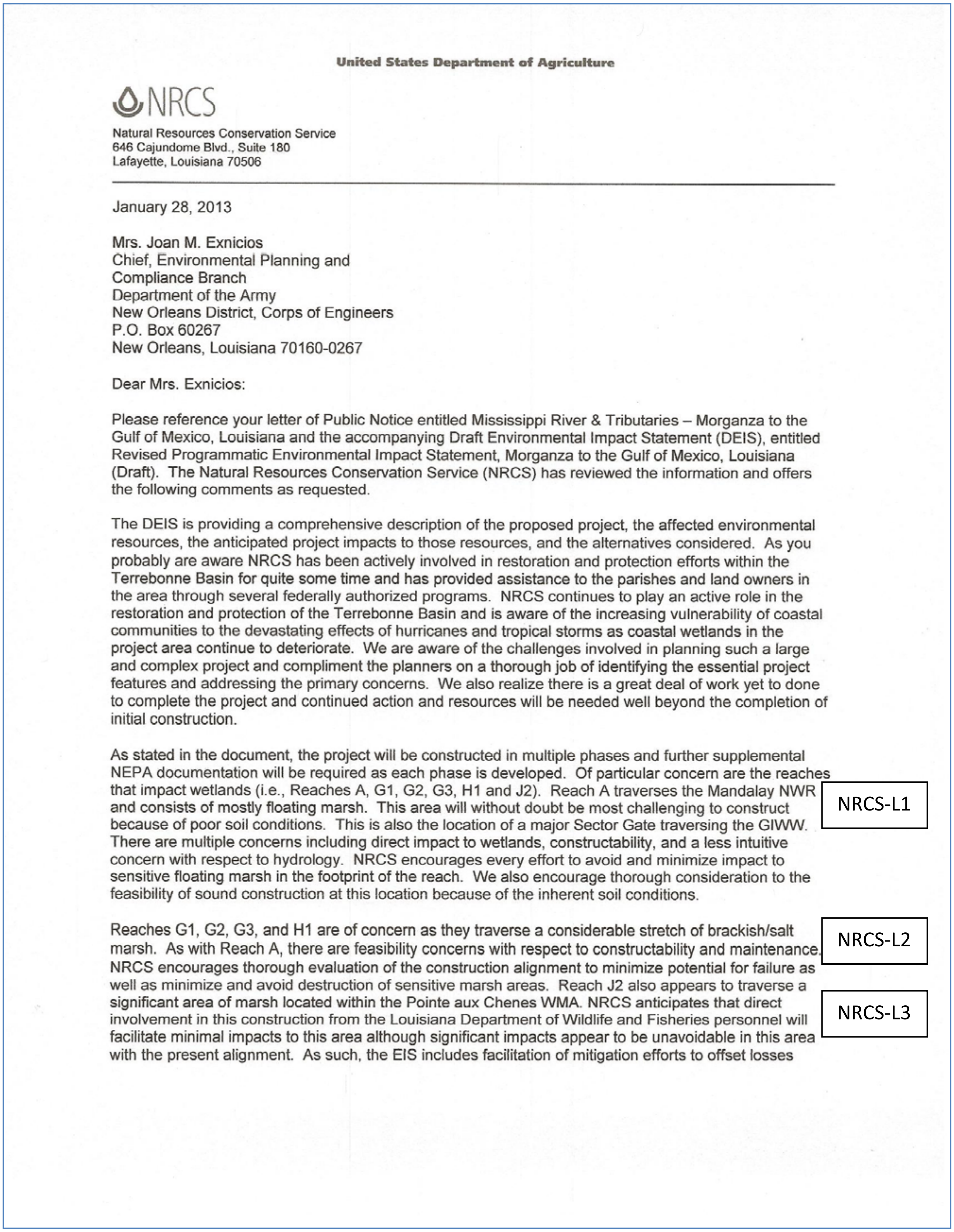
Guidelines for linear facilities

Guideline 3.1 to 3.16. The second sentence is not how we interpret construction of linear facilities. We consider the entire levee, floodgates, parallel borrow pits, etc., to be a linear facility and all of the Guidelines under this section from 3.1 to 3.16 must be treated and evaluated as a linear facility that will have certain hydrological or boundary effects on the ecosystem or land uses.

OCM5

Please let us know if you have any problems with these comments and/or make changes as necessary. We will likely have addition comments for you as we get responses back from the various commenting agencies.

Brian Marcks



United States Department of Agriculture

NRCS

Natural Resources Conservation Service
646 Cajundome Blvd., Suite 180
Lafayette, Louisiana 70506

January 28, 2013

Mrs. Joan M. Exnicios
Chief, Environmental Planning and
Compliance Branch
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mrs. Exnicios:

Please reference your letter of Public Notice entitled Mississippi River & Tributaries – Morganza to the Gulf of Mexico, Louisiana and the accompanying Draft Environmental Impact Statement (DEIS), entitled Revised Programmatic Environmental Impact Statement, Morganza to the Gulf of Mexico, Louisiana (Draft). The Natural Resources Conservation Service (NRCS) has reviewed the information and offers the following comments as requested.

The DEIS is providing a comprehensive description of the proposed project, the affected environmental resources, the anticipated project impacts to those resources, and the alternatives considered. As you probably are aware NRCS has been actively involved in restoration and protection efforts within the Terrebonne Basin for quite some time and has provided assistance to the parishes and land owners in the area through several federally authorized programs. NRCS continues to play an active role in the restoration and protection of the Terrebonne Basin and is aware of the increasing vulnerability of coastal communities to the devastating effects of hurricanes and tropical storms as coastal wetlands in the project area continue to deteriorate. We are aware of the challenges involved in planning such a large and complex project and compliment the planners on a thorough job of identifying the essential project features and addressing the primary concerns. We also realize there is a great deal of work yet to done to complete the project and continued action and resources will be needed well beyond the completion of initial construction.

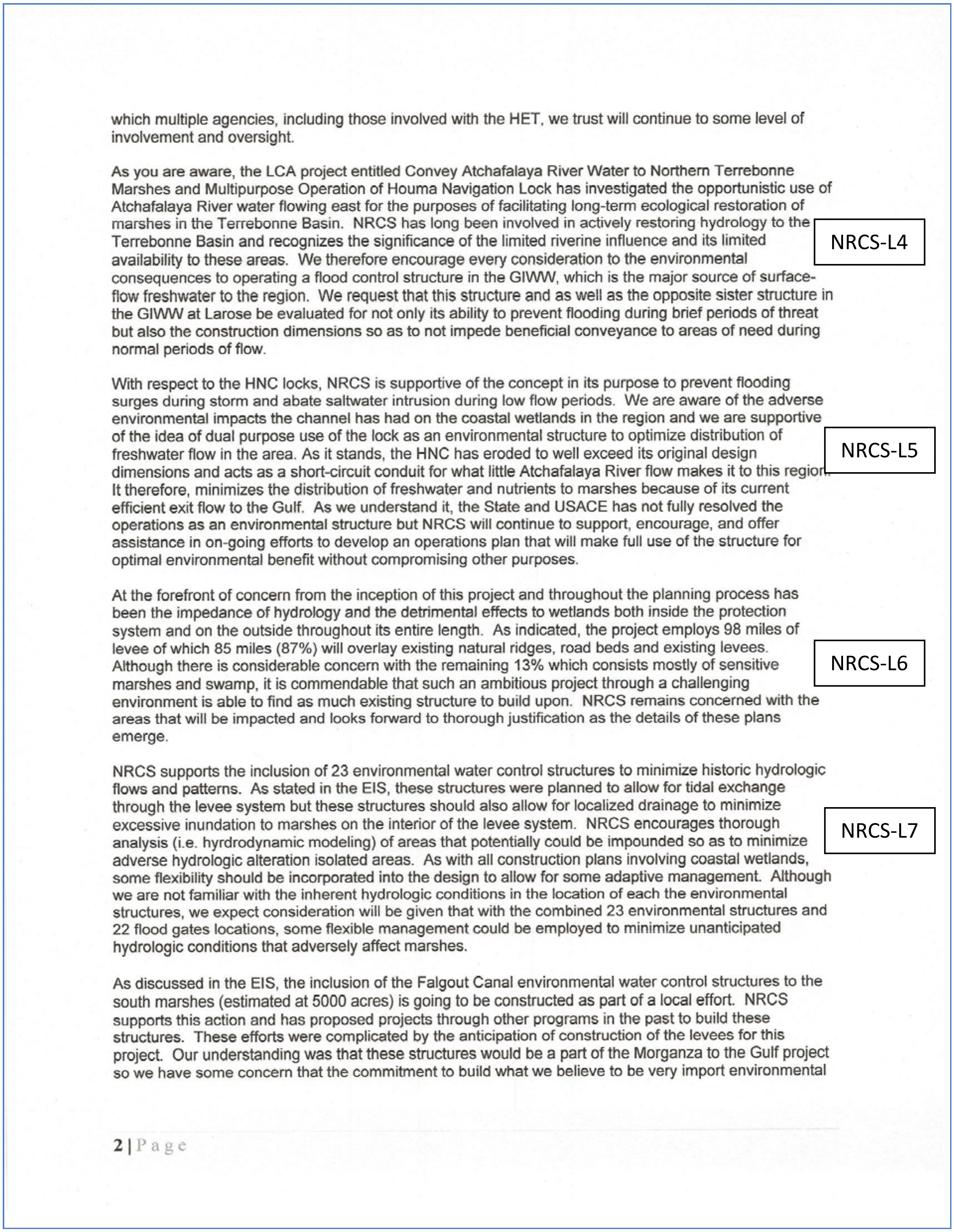
As stated in the document, the project will be constructed in multiple phases and further supplemental NEPA documentation will be required as each phase is developed. Of particular concern are the reaches that impact wetlands (i.e., Reaches A, G1, G2, G3, H1 and J2). Reach A traverses the Mandalay NWR and consists of mostly floating marsh. This area will without doubt be most challenging to construct because of poor soil conditions. This is also the location of a major Sector Gate traversing the GIWW. There are multiple concerns including direct impact to wetlands, constructability, and a less intuitive concern with respect to hydrology. NRCS encourages every effort to avoid and minimize impact to sensitive floating marsh in the footprint of the reach. We also encourage thorough consideration to the feasibility of sound construction at this location because of the inherent soil conditions.

NRCS-L1

Reaches G1, G2, G3, and H1 are of concern as they traverse a considerable stretch of brackish/salt marsh. As with Reach A, there are feasibility concerns with respect to constructability and maintenance. NRCS encourages thorough evaluation of the construction alignment to minimize potential for failure as well as minimize and avoid destruction of sensitive marsh areas. Reach J2 also appears to traverse a significant area of marsh located within the Pointe aux Chenes WMA. NRCS anticipates that direct involvement in this construction from the Louisiana Department of Wildlife and Fisheries personnel will facilitate minimal impacts to this area although significant impacts appear to be unavoidable in this area with the present alignment. As such, the EIS includes facilitation of mitigation efforts to offset losses

NRCS-L2

NRCS-L3



which multiple agencies, including those involved with the HET, we trust will continue to some level of involvement and oversight.

As you are aware, the LCA project entitled Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of Houma Navigation Lock has investigated the opportunistic use of Atchafalaya River water flowing east for the purposes of facilitating long-term ecological restoration of marshes in the Terrebonne Basin. NRCS has long been involved in actively restoring hydrology to the Terrebonne Basin and recognizes the significance of the limited riverine influence and its limited availability to these areas. We therefore encourage every consideration to the environmental consequences to operating a flood control structure in the GIWW, which is the major source of surface-flow freshwater to the region. We request that this structure and as well as the opposite sister structure in the GIWW at Larose be evaluated for not only its ability to prevent flooding during brief periods of threat but also the construction dimensions so as to not impede beneficial conveyance to areas of need during normal periods of flow.

NRCS-L4

With respect to the HNC locks, NRCS is supportive of the concept in its purpose to prevent flooding surges during storm and abate saltwater intrusion during low flow periods. We are aware of the adverse environmental impacts the channel has had on the coastal wetlands in the region and we are supportive of the idea of dual purpose use of the lock as an environmental structure to optimize distribution of freshwater flow in the area. As it stands, the HNC has eroded to well exceed its original design dimensions and acts as a short-circuit conduit for what little Atchafalaya River flow makes it to this region. It therefore, minimizes the distribution of freshwater and nutrients to marshes because of its current efficient exit flow to the Gulf. As we understand it, the State and USACE has not fully resolved the operations as an environmental structure but NRCS will continue to support, encourage, and offer assistance in on-going efforts to develop an operations plan that will make full use of the structure for optimal environmental benefit without compromising other purposes.

NRCS-L5

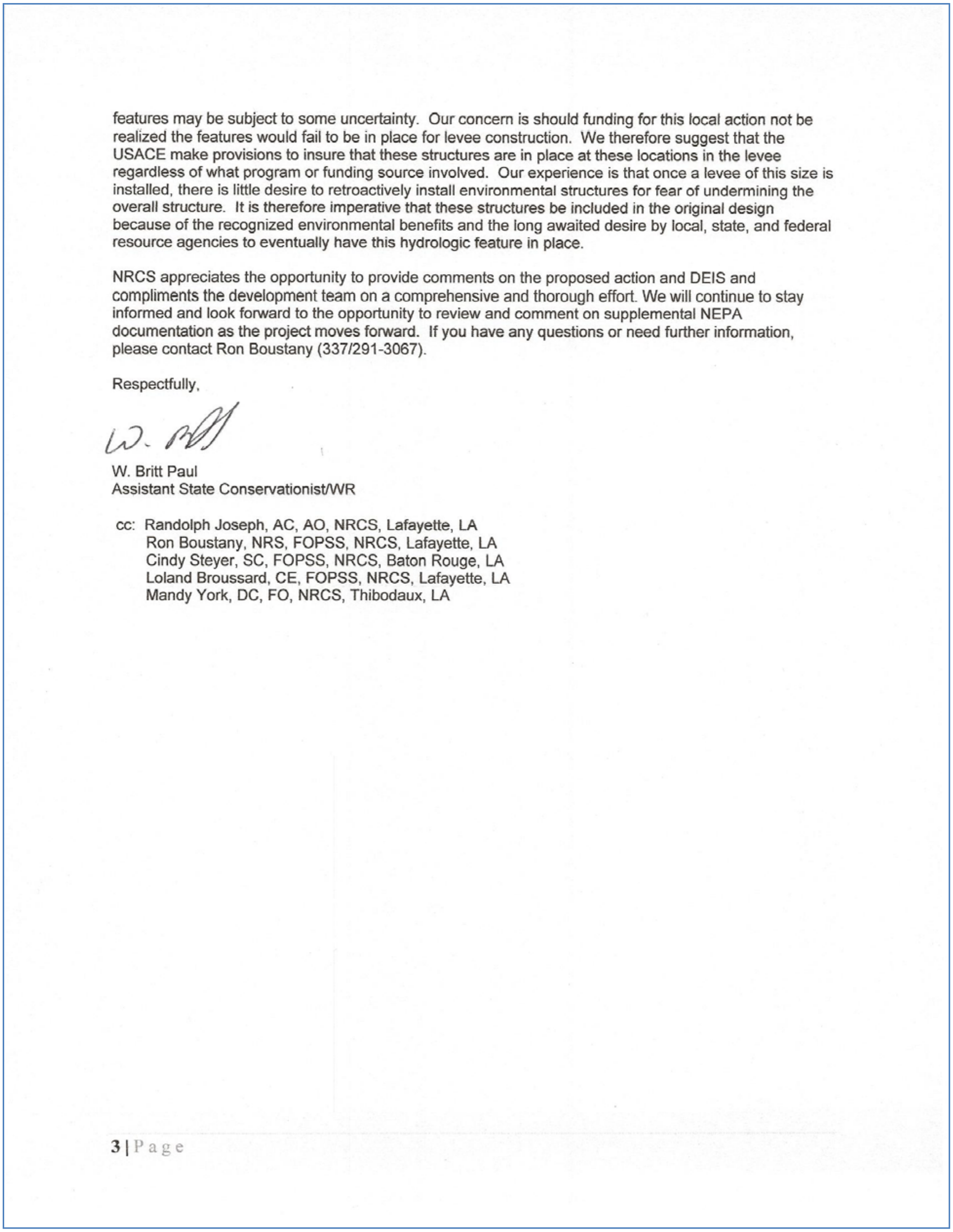
At the forefront of concern from the inception of this project and throughout the planning process has been the impedance of hydrology and the detrimental effects to wetlands both inside the protection system and on the outside throughout its entire length. As indicated, the project employs 98 miles of levee of which 85 miles (87%) will overlay existing natural ridges, road beds and existing levees. Although there is considerable concern with the remaining 13% which consists mostly of sensitive marshes and swamp, it is commendable that such an ambitious project through a challenging environment is able to find as much existing structure to build upon. NRCS remains concerned with the areas that will be impacted and looks forward to thorough justification as the details of these plans emerge.

NRCS-L6

NRCS supports the inclusion of 23 environmental water control structures to minimize historic hydrologic flows and patterns. As stated in the EIS, these structures were planned to allow for tidal exchange through the levee system but these structures should also allow for localized drainage to minimize excessive inundation to marshes on the interior of the levee system. NRCS encourages thorough analysis (i.e. hyrdrodynamic modeling) of areas that potentially could be impounded so as to minimize adverse hydrologic alteration isolated areas. As with all construction plans involving coastal wetlands, some flexibility should be incorporated into the design to allow for some adaptive management. Although we are not familiar with the inherent hydrologic conditions in the location of each the environmental structures, we expect consideration will be given that with the combined 23 environmental structures and 22 flood gates locations, some flexible management could be employed to minimize unanticipated hydrologic conditions that adversely affect marshes.

NRCS-L7

As discussed in the EIS, the inclusion of the Falgout Canal environmental water control structures to the south marshes (estimated at 5000 acres) is going to be constructed as part of a local effort. NRCS supports this action and has proposed projects through other programs in the past to build these structures. These efforts were complicated by the anticipation of construction of the levees for this project. Our understanding was that these structures would be a part of the Morganza to the Gulf project so we have some concern that the commitment to build what we believe to be very import environmental



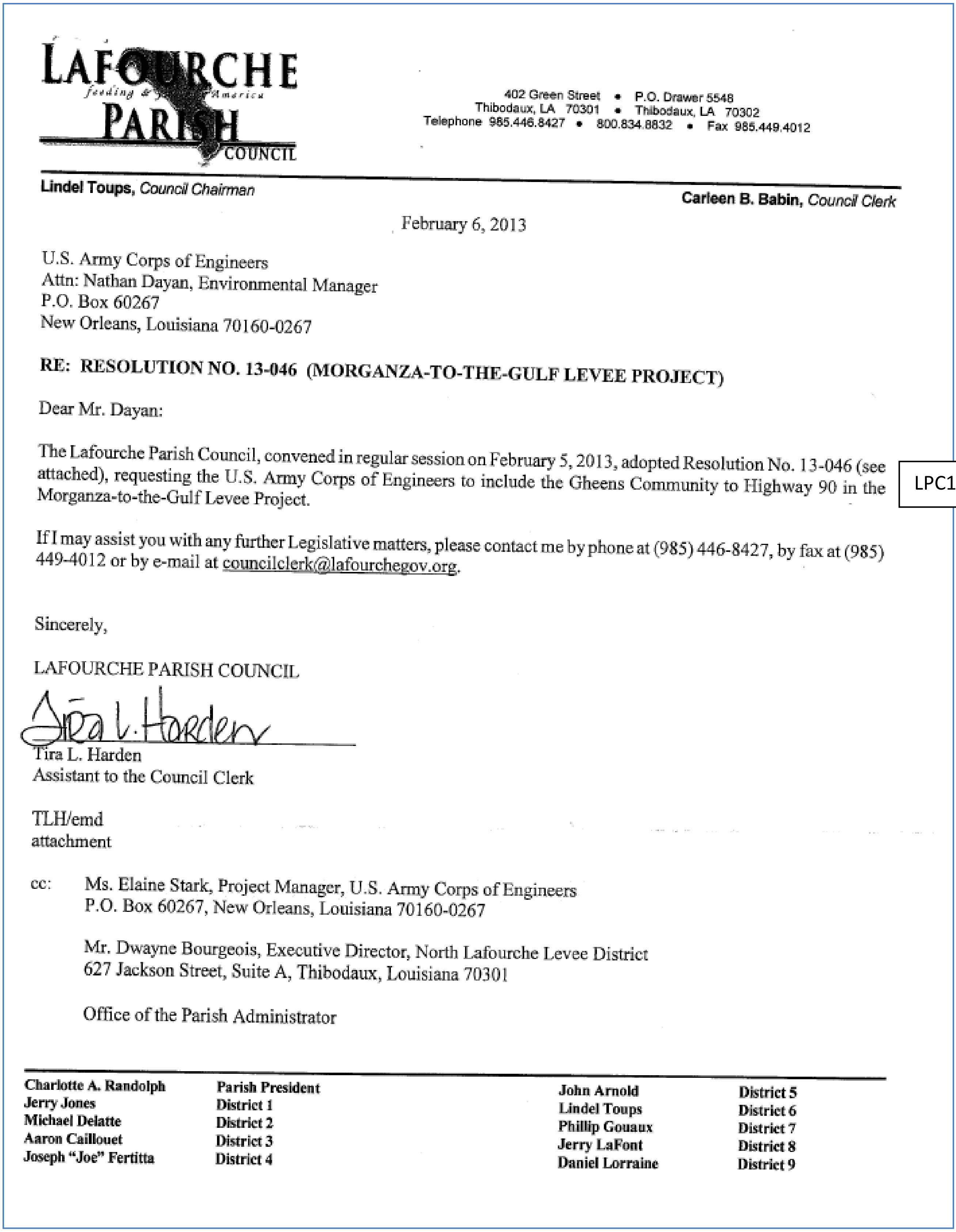
features may be subject to some uncertainty. Our concern is should funding for this local action not be realized the features would fail to be in place for levee construction. We therefore suggest that the USACE make provisions to insure that these structures are in place at these locations in the levee regardless of what program or funding source involved. Our experience is that once a levee of this size is installed, there is little desire to retroactively install environmental structures for fear of undermining the overall structure. It is therefore imperative that these structures be included in the original design because of the recognized environmental benefits and the long awaited desire by local, state, and federal resource agencies to eventually have this hydrologic feature in place.

NRCS appreciates the opportunity to provide comments on the proposed action and DEIS and compliments the development team on a comprehensive and thorough effort. We will continue to stay informed and look forward to the opportunity to review and comment on supplemental NEPA documentation as the project moves forward. If you have any questions or need further information, please contact Ron Boustany (337/291-3067).

Respectfully,

W. Britt Paul
Assistant State Conservationist/WR

cc: Randolph Joseph, AC, AO, NRCS, Lafayette, LA
Ron Boustany, NRS, FOPSS, NRCS, Lafayette, LA
Cindy Steyer, SC, FOPSS, NRCS, Baton Rouge, LA
Loland Broussard, CE, FOPSS, NRCS, Lafayette, LA
Mandy York, DC, FO, NRCS, Thibodaux, LA



LAFOURCHE PARISH COUNCIL
feeding & ... America

402 Green Street • P.O. Drawer 5548
Thibodaux, LA 70301 • Thibodaux, LA 70302
Telephone 985.446.8427 • 800.834.8832 • Fax 985.449.4012

Lindel Toups, *Council Chairman*
Carleen B. Babin, *Council Clerk*

February 6, 2013

U.S. Army Corps of Engineers
Attn: Nathan Dayan, Environmental Manager
P.O. Box 60267
New Orleans, Louisiana 70160-0267

RE: RESOLUTION NO. 13-046 (MORGANZA-TO-THE-GULF LEVEE PROJECT)

Dear Mr. Dayan:

The Lafourche Parish Council, convened in regular session on February 5, 2013, adopted Resolution No. 13-046 (see attached), requesting the U.S. Army Corps of Engineers to include the Gheens Community to Highway 90 in the Morganza-to-the-Gulf Levee Project.

LPC1

If I may assist you with any further Legislative matters, please contact me by phone at (985) 446-8427, by fax at (985) 449-4012 or by e-mail at councilclerk@lafourchegov.org.

Sincerely,

LAFOURCHE PARISH COUNCIL

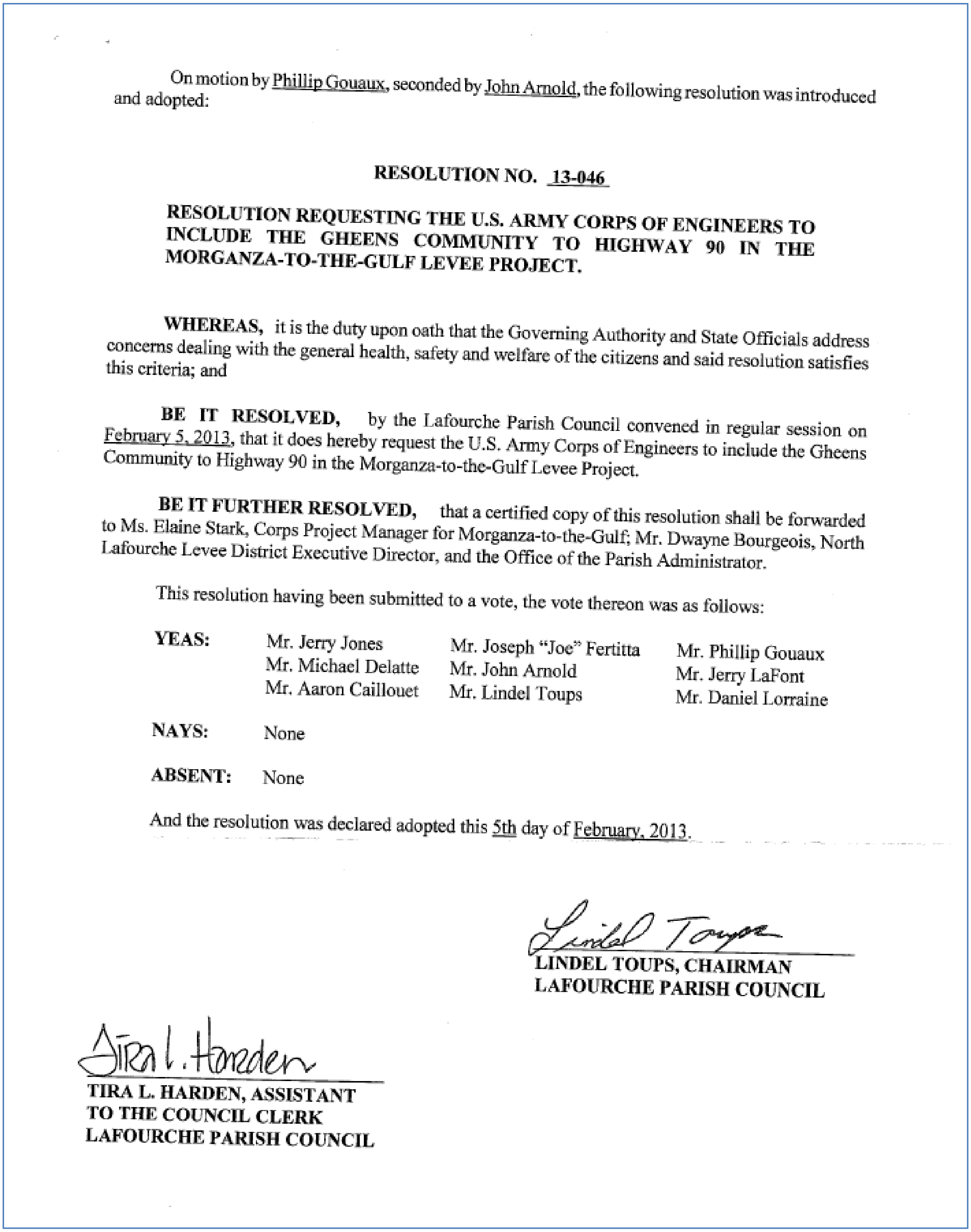
Tira L. Harden
Tira L. Harden
Assistant to the Council Clerk

TLH/emd
attachment

cc: Ms. Elaine Stark, Project Manager, U.S. Army Corps of Engineers
P.O. Box 60267, New Orleans, Louisiana 70160-0267

Mr. Dwayne Bourgeois, Executive Director, North Lafourche Levee District
627 Jackson Street, Suite A, Thibodaux, Louisiana 70301

Office of the Parish Administrator



On motion by Phillip Gouaux, seconded by John Arnold, the following resolution was introduced and adopted:

RESOLUTION NO. 13-046

RESOLUTION REQUESTING THE U.S. ARMY CORPS OF ENGINEERS TO INCLUDE THE GHEENS COMMUNITY TO HIGHWAY 90 IN THE MORGANZA-TO-THE-GULF LEVEE PROJECT.

WHEREAS, it is the duty upon oath that the Governing Authority and State Officials address concerns dealing with the general health, safety and welfare of the citizens and said resolution satisfies this criteria; and

BE IT RESOLVED, by the Lafourche Parish Council convened in regular session on February 5, 2013, that it does hereby request the U.S. Army Corps of Engineers to include the Gheens Community to Highway 90 in the Morganza-to-the-Gulf Levee Project.

BE IT FURTHER RESOLVED, that a certified copy of this resolution shall be forwarded to Ms. Elaine Stark, Corps Project Manager for Morganza-to-the-Gulf; Mr. Dwayne Bourgeois, North Lafourche Levee District Executive Director, and the Office of the Parish Administrator.

This resolution having been submitted to a vote, the vote thereon was as follows:

YEAS:
Mr. Jerry Jones
Mr. Michael Delatte
Mr. Aaron Caillouet
Mr. Joseph "Joe" Fertitta
Mr. John Arnold
Mr. Lindel Toups
Mr. Phillip Gouaux
Mr. Jerry LaFont
Mr. Daniel Lorraine

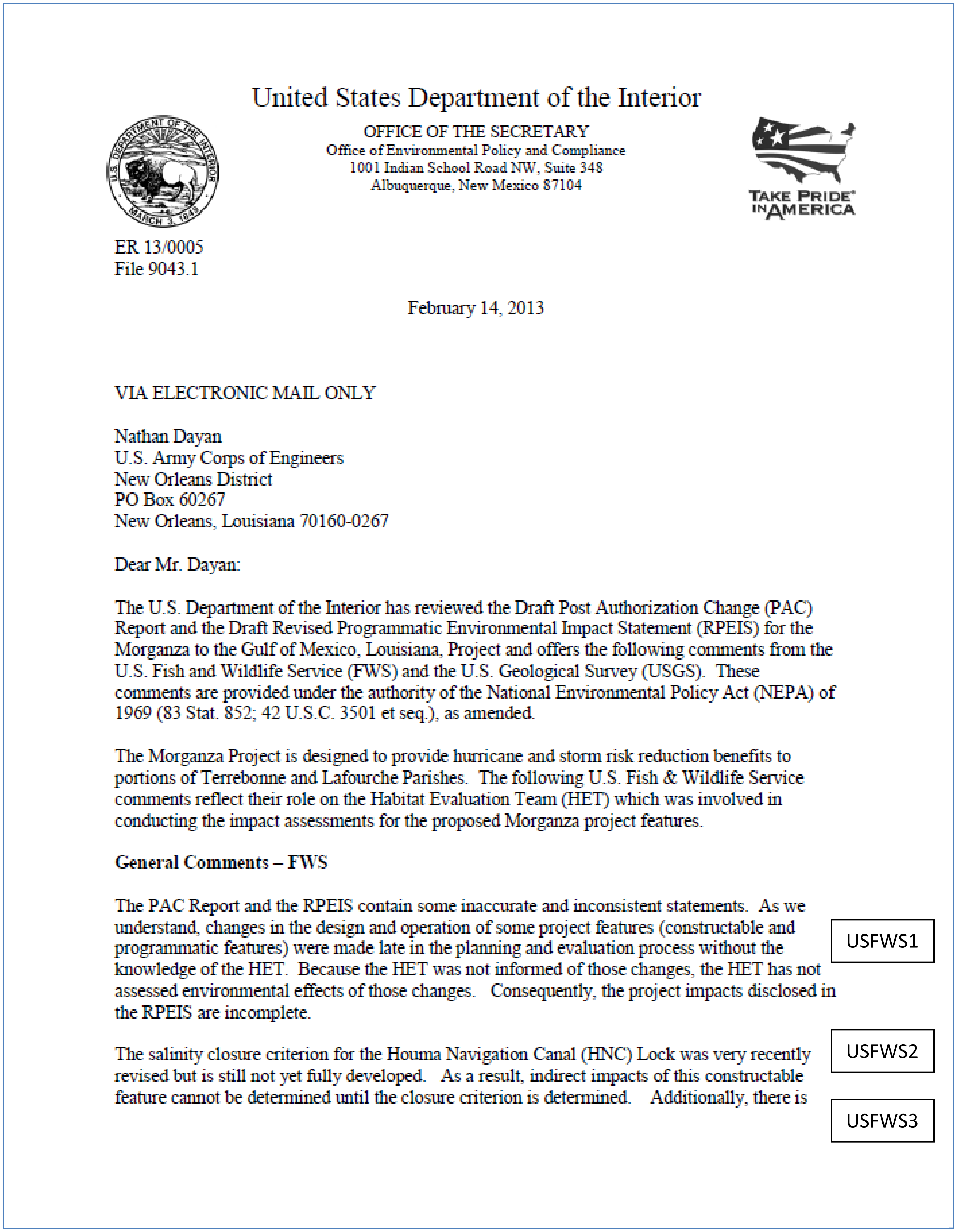
NAYS: None

ABSENT: None

And the resolution was declared adopted this 5th day of February, 2013.

Lindel Toups
LINDEL TOUPS, CHAIRMAN
LAFOURCHE PARISH COUNCIL

Tira L. Harden
TIRA L. HARDEN, ASSISTANT
TO THE COUNCIL CLERK
LAFOURCHE PARISH COUNCIL



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

ER 13/0005
File 9043.1

February 14, 2013

VIA ELECTRONIC MAIL ONLY

Nathan Dayan
U.S. Army Corps of Engineers
New Orleans District
PO Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Dayan:

The U.S. Department of the Interior has reviewed the Draft Post Authorization Change (PAC) Report and the Draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Morganza to the Gulf of Mexico, Louisiana, Project and offers the following comments from the U.S. Fish and Wildlife Service (FWS) and the U.S. Geological Survey (USGS). These comments are provided under the authority of the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 3501 et seq.), as amended.

The Morganza Project is designed to provide hurricane and storm risk reduction benefits to portions of Terrebonne and Lafourche Parishes. The following U.S. Fish & Wildlife Service comments reflect their role on the Habitat Evaluation Team (HET) which was involved in conducting the impact assessments for the proposed Morganza project features.

General Comments – FWS

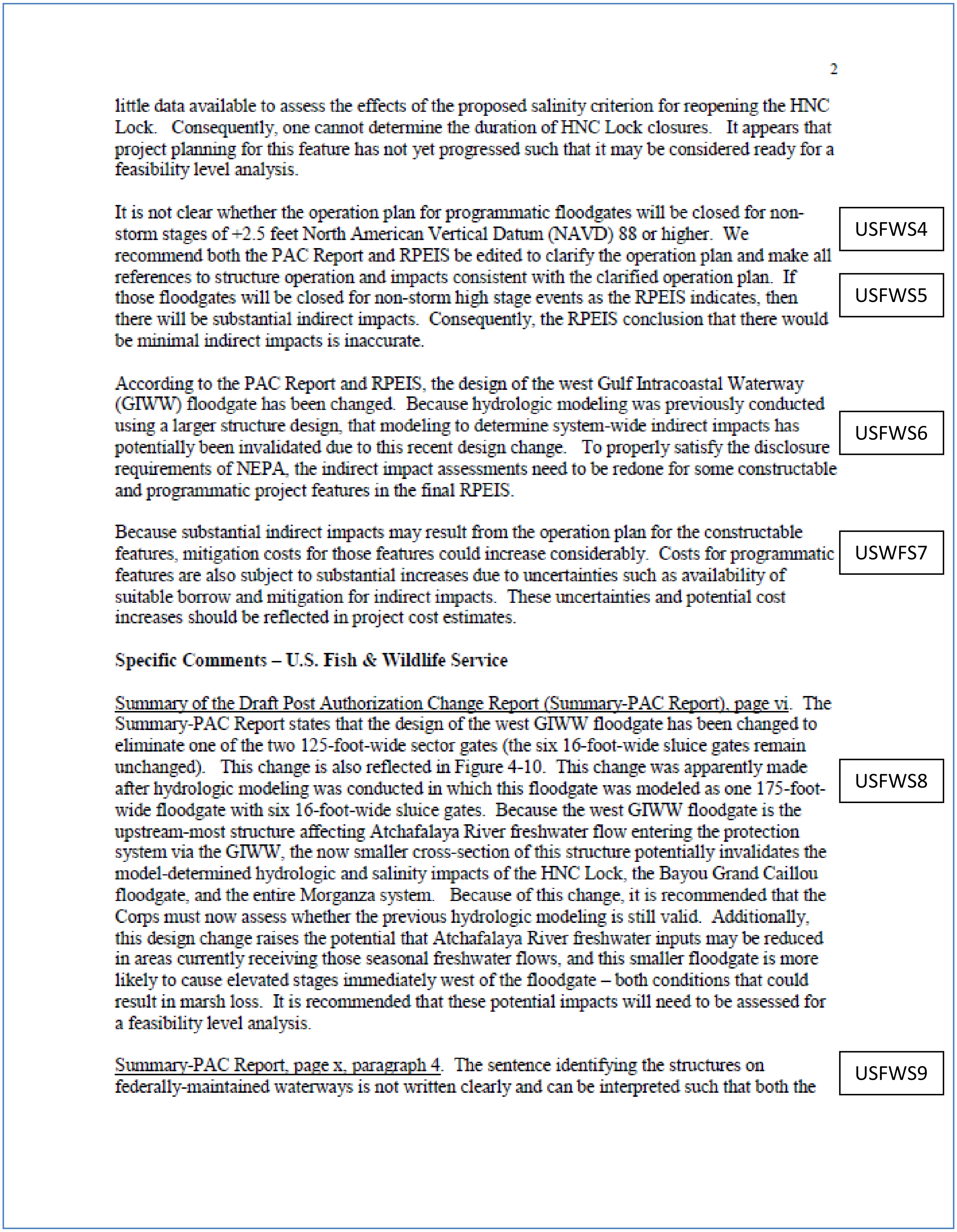
The PAC Report and the RPEIS contain some inaccurate and inconsistent statements. As we understand, changes in the design and operation of some project features (constructable and programmatic features) were made late in the planning and evaluation process without the knowledge of the HET. Because the HET was not informed of those changes, the HET has not assessed environmental effects of those changes. Consequently, the project impacts disclosed in the RPEIS are incomplete.

USFWS1

The salinity closure criterion for the Houma Navigation Canal (HNC) Lock was very recently revised but is still not yet fully developed. As a result, indirect impacts of this constructable feature cannot be determined until the closure criterion is determined. Additionally, there is

USFWS2

USFWS3



little data available to assess the effects of the proposed salinity criterion for reopening the HNC Lock. Consequently, one cannot determine the duration of HNC Lock closures. It appears that project planning for this feature has not yet progressed such that it may be considered ready for a feasibility level analysis.

It is not clear whether the operation plan for programmatic floodgates will be closed for non-storm stages of +2.5 feet North American Vertical Datum (NAVD) 88 or higher. We recommend both the PAC Report and RPEIS be edited to clarify the operation plan and make all references to structure operation and impacts consistent with the clarified operation plan. If those floodgates will be closed for non-storm high stage events as the RPEIS indicates, then there will be substantial indirect impacts. Consequently, the RPEIS conclusion that there would be minimal indirect impacts is inaccurate.

USFWS4

USFWS5

According to the PAC Report and RPEIS, the design of the west Gulf Intracoastal Waterway (GIWW) floodgate has been changed. Because hydrologic modeling was previously conducted using a larger structure design, that modeling to determine system-wide indirect impacts has potentially been invalidated due to this recent design change. To properly satisfy the disclosure requirements of NEPA, the indirect impact assessments need to be redone for some constructable and programmatic project features in the final RPEIS.

USFWS6

Because substantial indirect impacts may result from the operation plan for the constructable features, mitigation costs for those features could increase considerably. Costs for programmatic features are also subject to substantial increases due to uncertainties such as availability of suitable borrow and mitigation for indirect impacts. These uncertainties and potential cost increases should be reflected in project cost estimates.

USWFS7

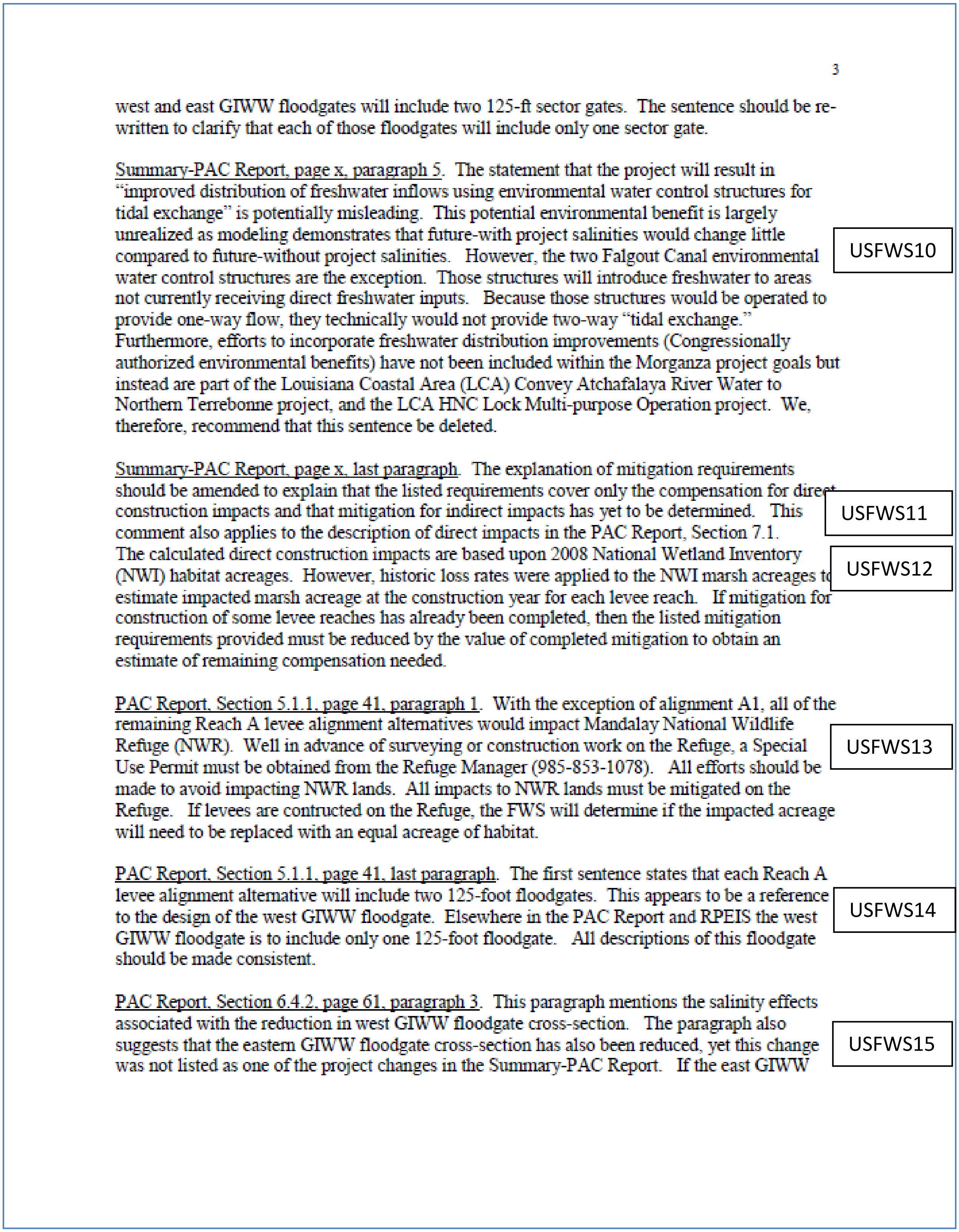
Specific Comments – U.S. Fish & Wildlife Service

Summary of the Draft Post Authorization Change Report (Summary-PAC Report), page vi. The Summary-PAC Report states that the design of the west GIWW floodgate has been changed to eliminate one of the two 125-foot-wide sector gates (the six 16-foot-wide sluice gates remain unchanged). This change is also reflected in Figure 4-10. This change was apparently made after hydrologic modeling was conducted in which this floodgate was modeled as one 175-foot-wide floodgate with six 16-foot-wide sluice gates. Because the west GIWW floodgate is the upstream-most structure affecting Atchafalaya River freshwater flow entering the protection system via the GIWW, the now smaller cross-section of this structure potentially invalidates the model-determined hydrologic and salinity impacts of the HNC Lock, the Bayou Grand Caillou floodgate, and the entire Morganza system. Because of this change, it is recommended that the Corps must now assess whether the previous hydrologic modeling is still valid. Additionally, this design change raises the potential that Atchafalaya River freshwater inputs may be reduced in areas currently receiving those seasonal freshwater flows, and this smaller floodgate is more likely to cause elevated stages immediately west of the floodgate – both conditions that could result in marsh loss. It is recommended that these potential impacts will need to be assessed for a feasibility level analysis.

USFWS8

Summary-PAC Report, page x, paragraph 4. The sentence identifying the structures on federally-maintained waterways is not written clearly and can be interpreted such that both the

USFWS9



west and east GIWW floodgates will include two 125-ft sector gates. The sentence should be re-written to clarify that each of those floodgates will include only one sector gate.

USFWS10

Summary-PAC Report, page x, paragraph 5. The statement that the project will result in "improved distribution of freshwater inflows using environmental water control structures for tidal exchange" is potentially misleading. This potential environmental benefit is largely unrealized as modeling demonstrates that future-with project salinities would change little compared to future-without project salinities. However, the two Falgout Canal environmental water control structures are the exception. Those structures will introduce freshwater to areas not currently receiving direct freshwater inputs. Because those structures would be operated to provide one-way flow, they technically would not provide two-way "tidal exchange." Furthermore, efforts to incorporate freshwater distribution improvements (Congressionally authorized environmental benefits) have not been included within the Morganza project goals but instead are part of the Louisiana Coastal Area (LCA) Convey Atchafalaya River Water to Northern Terrebonne project, and the LCA HNC Lock Multi-purpose Operation project. We, therefore, recommend that this sentence be deleted.

USFWS11

USFWS12

Summary-PAC Report, page x, last paragraph. The explanation of mitigation requirements should be amended to explain that the listed requirements cover only the compensation for direct construction impacts and that mitigation for indirect impacts has yet to be determined. This comment also applies to the description of direct impacts in the PAC Report, Section 7.1. The calculated direct construction impacts are based upon 2008 National Wetland Inventory (NWI) habitat acreages. However, historic loss rates were applied to the NWI marsh acreages to estimate impacted marsh acreage at the construction year for each levee reach. If mitigation for construction of some levee reaches has already been completed, then the listed mitigation requirements provided must be reduced by the value of completed mitigation to obtain an estimate of remaining compensation needed.

USFWS13

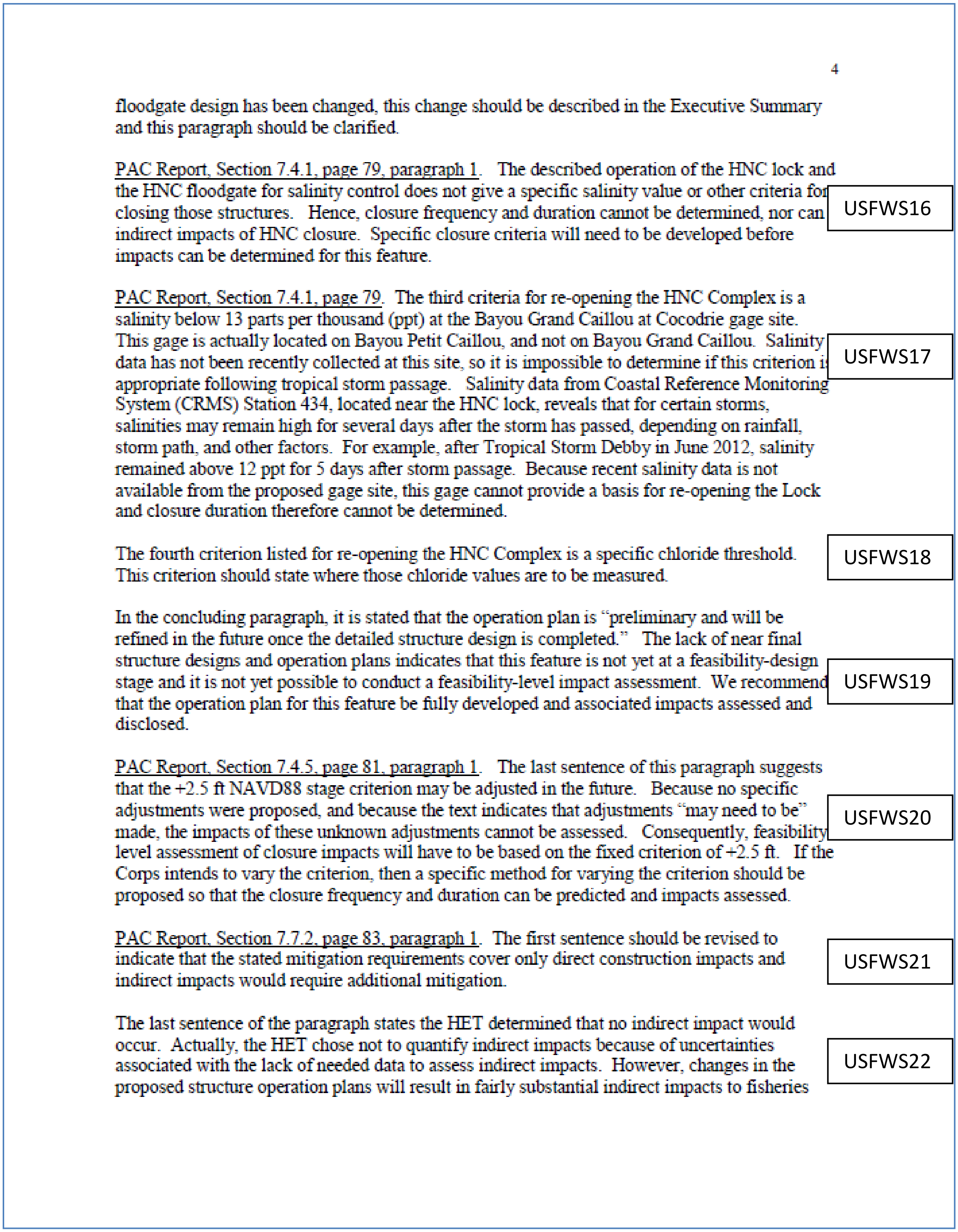
PAC Report, Section 5.1.1, page 41, paragraph 1. With the exception of alignment A1, all of the remaining Reach A levee alignment alternatives would impact Mandalay National Wildlife Refuge (NWR). Well in advance of surveying or construction work on the Refuge, a Special Use Permit must be obtained from the Refuge Manager (985-853-1078). All efforts should be made to avoid impacting NWR lands. All impacts to NWR lands must be mitigated on the Refuge. If levees are contructed on the Refuge, the FWS will determine if the impacted acreage will need to be replaced with an equal acreage of habitat.

USFWS14

PAC Report, Section 5.1.1, page 41, last paragraph. The first sentence states that each Reach A levee alignment alternative will include two 125-foot floodgates. This appears to be a reference to the design of the west GIWW floodgate. Elsewhere in the PAC Report and RPEIS the west GIWW floodgate is to include only one 125-foot floodgate. All descriptions of this floodgate should be made consistent.

USFWS15

PAC Report, Section 6.4.2, page 61, paragraph 3. This paragraph mentions the salinity effects associated with the reduction in west GIWW floodgate cross-section. The paragraph also suggests that the eastern GIWW floodgate cross-section has also been reduced, yet this change was not listed as one of the project changes in the Summary-PAC Report. If the east GIWW



floodgate design has been changed, this change should be described in the Executive Summary and this paragraph should be clarified.

PAC Report, Section 7.4.1, page 79, paragraph 1. The described operation of the HNC lock and the HNC floodgate for salinity control does not give a specific salinity value or other criteria for closing those structures. Hence, closure frequency and duration cannot be determined, nor can indirect impacts of HNC closure. Specific closure criteria will need to be developed before impacts can be determined for this feature.

USFWS16

PAC Report, Section 7.4.1, page 79. The third criteria for re-opening the HNC Complex is a salinity below 13 parts per thousand (ppt) at the Bayou Grand Caillou at Cocodrie gage site. This gage is actually located on Bayou Petit Caillou, and not on Bayou Grand Caillou. Salinity data has not been recently collected at this site, so it is impossible to determine if this criterion is appropriate following tropical storm passage. Salinity data from Coastal Reference Monitoring System (CRMS) Station 434, located near the HNC lock, reveals that for certain storms, salinities may remain high for several days after the storm has passed, depending on rainfall, storm path, and other factors. For example, after Tropical Storm Debby in June 2012, salinity remained above 12 ppt for 5 days after storm passage. Because recent salinity data is not available from the proposed gage site, this gage cannot provide a basis for re-opening the Lock and closure duration therefore cannot be determined.

USFWS17

The fourth criterion listed for re-opening the HNC Complex is a specific chloride threshold. This criterion should state where those chloride values are to be measured.

USFWS18

In the concluding paragraph, it is stated that the operation plan is "preliminary and will be refined in the future once the detailed structure design is completed." The lack of near final structure designs and operation plans indicates that this feature is not yet at a feasibility-design stage and it is not yet possible to conduct a feasibility-level impact assessment. We recommend that the operation plan for this feature be fully developed and associated impacts assessed and disclosed.

USFWS19

PAC Report, Section 7.4.5, page 81, paragraph 1. The last sentence of this paragraph suggests that the +2.5 ft NAVD88 stage criterion may be adjusted in the future. Because no specific adjustments were proposed, and because the text indicates that adjustments "may need to be" made, the impacts of these unknown adjustments cannot be assessed. Consequently, feasibility level assessment of closure impacts will have to be based on the fixed criterion of +2.5 ft. If the Corps intends to vary the criterion, then a specific method for varying the criterion should be proposed so that the closure frequency and duration can be predicted and impacts assessed.

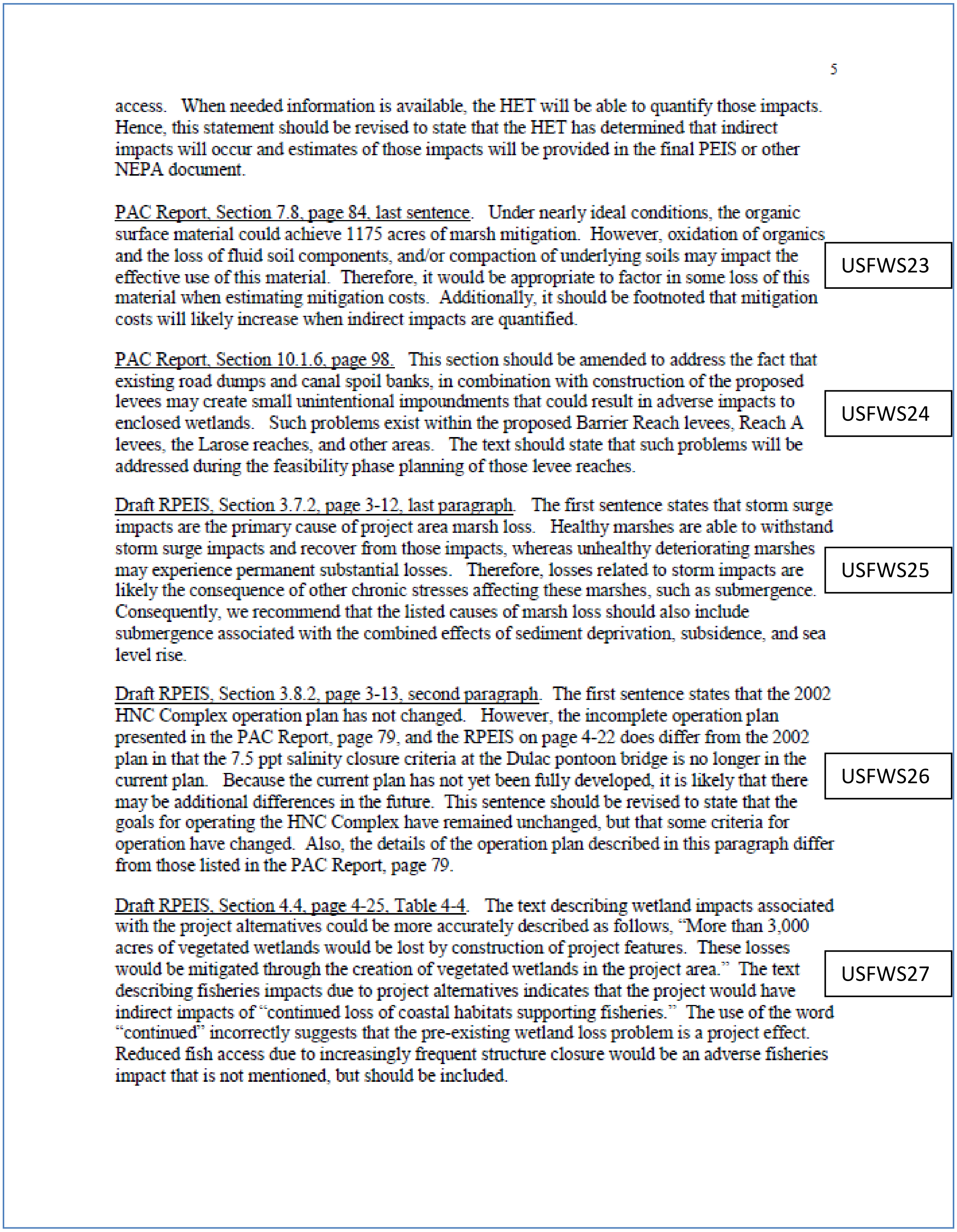
USFWS20

PAC Report, Section 7.7.2, page 83, paragraph 1. The first sentence should be revised to indicate that the stated mitigation requirements cover only direct construction impacts and indirect impacts would require additional mitigation.

USFWS21

The last sentence of the paragraph states the HET determined that no indirect impact would occur. Actually, the HET chose not to quantify indirect impacts because of uncertainties associated with the lack of needed data to assess indirect impacts. However, changes in the proposed structure operation plans will result in fairly substantial indirect impacts to fisheries

USFWS22



access. When needed information is available, the HET will be able to quantify those impacts. Hence, this statement should be revised to state that the HET has determined that indirect impacts will occur and estimates of those impacts will be provided in the final PEIS or other NEPA document.

PAC Report, Section 7.8, page 84, last sentence. Under nearly ideal conditions, the organic surface material could achieve 1175 acres of marsh mitigation. However, oxidation of organics and the loss of fluid soil components, and/or compaction of underlying soils may impact the effective use of this material. Therefore, it would be appropriate to factor in some loss of this material when estimating mitigation costs. Additionally, it should be footnoted that mitigation costs will likely increase when indirect impacts are quantified.

USFWS23

PAC Report, Section 10.1.6, page 98. This section should be amended to address the fact that existing road dumps and canal spoil banks, in combination with construction of the proposed levees may create small unintentional impoundments that could result in adverse impacts to enclosed wetlands. Such problems exist within the proposed Barrier Reach levees, Reach A levees, the Larose reaches, and other areas. The text should state that such problems will be addressed during the feasibility phase planning of those levee reaches.

USFWS24

Draft RPEIS, Section 3.7.2, page 3-12, last paragraph. The first sentence states that storm surge impacts are the primary cause of project area marsh loss. Healthy marshes are able to withstand storm surge impacts and recover from those impacts, whereas unhealthy deteriorating marshes may experience permanent substantial losses. Therefore, losses related to storm impacts are likely the consequence of other chronic stresses affecting these marshes, such as submergence. Consequently, we recommend that the listed causes of marsh loss should also include submergence associated with the combined effects of sediment deprivation, subsidence, and sea level rise.

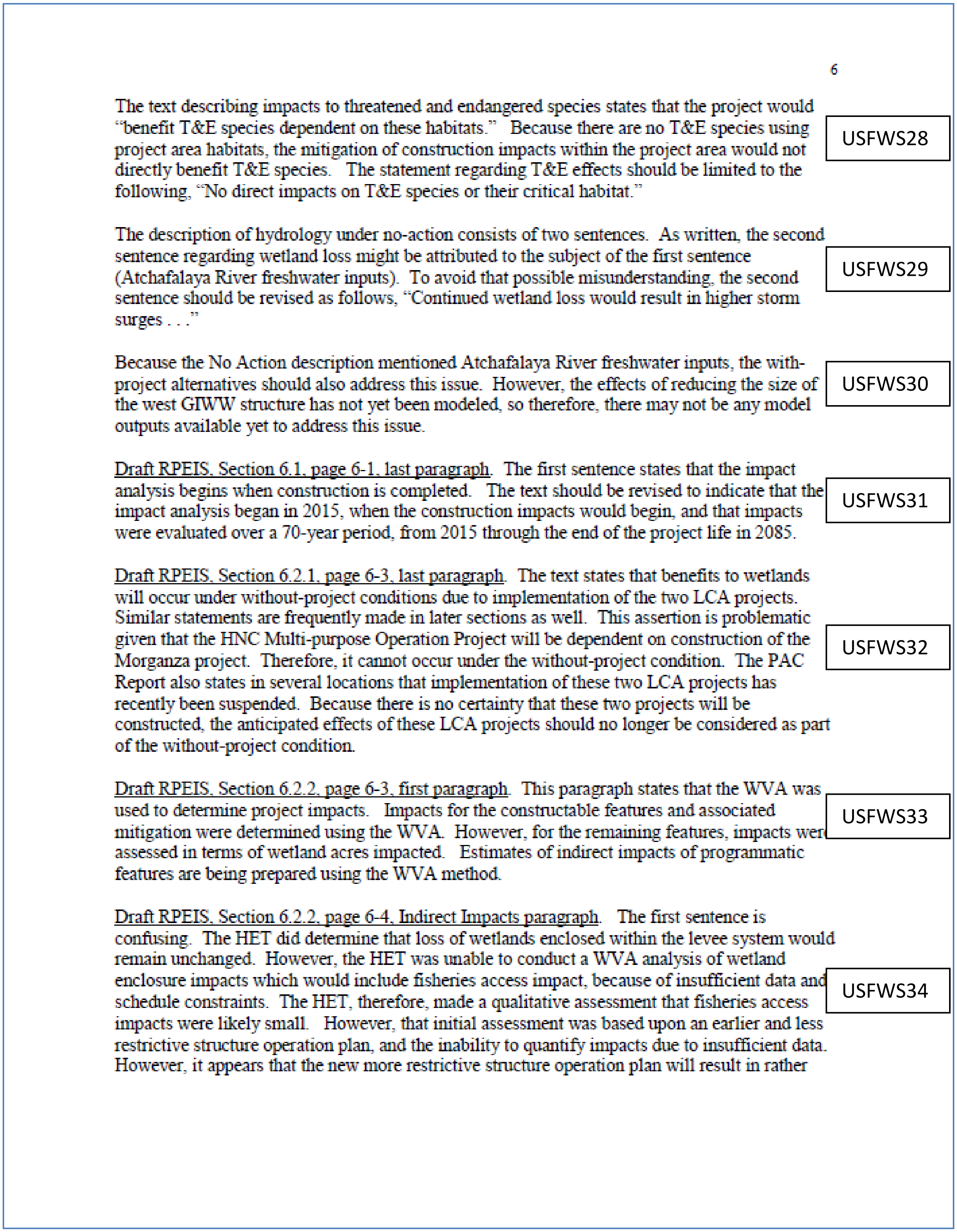
USFWS25

Draft RPEIS, Section 3.8.2, page 3-13, second paragraph. The first sentence states that the 2002 HNC Complex operation plan has not changed. However, the incomplete operation plan presented in the PAC Report, page 79, and the RPEIS on page 4-22 does differ from the 2002 plan in that the 7.5 ppt salinity closure criteria at the Dulac pontoon bridge is no longer in the current plan. Because the current plan has not yet been fully developed, it is likely that there may be additional differences in the future. This sentence should be revised to state that the goals for operating the HNC Complex have remained unchanged, but that some criteria for operation have changed. Also, the details of the operation plan described in this paragraph differ from those listed in the PAC Report, page 79.

USFWS26

Draft RPEIS, Section 4.4, page 4-25, Table 4-4. The text describing wetland impacts associated with the project alternatives could be more accurately described as follows, "More than 3,000 acres of vegetated wetlands would be lost by construction of project features. These losses would be mitigated through the creation of vegetated wetlands in the project area." The text describing fisheries impacts due to project alternatives indicates that the project would have indirect impacts of "continued loss of coastal habitats supporting fisheries." The use of the word "continued" incorrectly suggests that the pre-existing wetland loss problem is a project effect. Reduced fish access due to increasingly frequent structure closure would be an adverse fisheries impact that is not mentioned, but should be included.

USFWS27



The text describing impacts to threatened and endangered species states that the project would "benefit T&E species dependent on these habitats." Because there are no T&E species using project area habitats, the mitigation of construction impacts within the project area would not directly benefit T&E species. The statement regarding T&E effects should be limited to the following, "No direct impacts on T&E species or their critical habitat."

USFWS28

The description of hydrology under no-action consists of two sentences. As written, the second sentence regarding wetland loss might be attributed to the subject of the first sentence (Atchafalaya River freshwater inputs). To avoid that possible misunderstanding, the second sentence should be revised as follows, "Continued wetland loss would result in higher storm surges . . ."

USFWS29

Because the No Action description mentioned Atchafalaya River freshwater inputs, the with-project alternatives should also address this issue. However, the effects of reducing the size of the west GIWW structure has not yet been modeled, so therefore, there may not be any model outputs available yet to address this issue.

USFWS30

Draft RPEIS, Section 6.1, page 6-1, last paragraph. The first sentence states that the impact analysis begins when construction is completed. The text should be revised to indicate that the impact analysis began in 2015, when the construction impacts would begin, and that impacts were evaluated over a 70-year period, from 2015 through the end of the project life in 2085.

USFWS31

Draft RPEIS, Section 6.2.1, page 6-3, last paragraph. The text states that benefits to wetlands will occur under without-project conditions due to implementation of the two LCA projects. Similar statements are frequently made in later sections as well. This assertion is problematic given that the HNC Multi-purpose Operation Project will be dependent on construction of the Morganza project. Therefore, it cannot occur under the without-project condition. The PAC Report also states in several locations that implementation of these two LCA projects has recently been suspended. Because there is no certainty that these two projects will be constructed, the anticipated effects of these LCA projects should no longer be considered as part of the without-project condition.

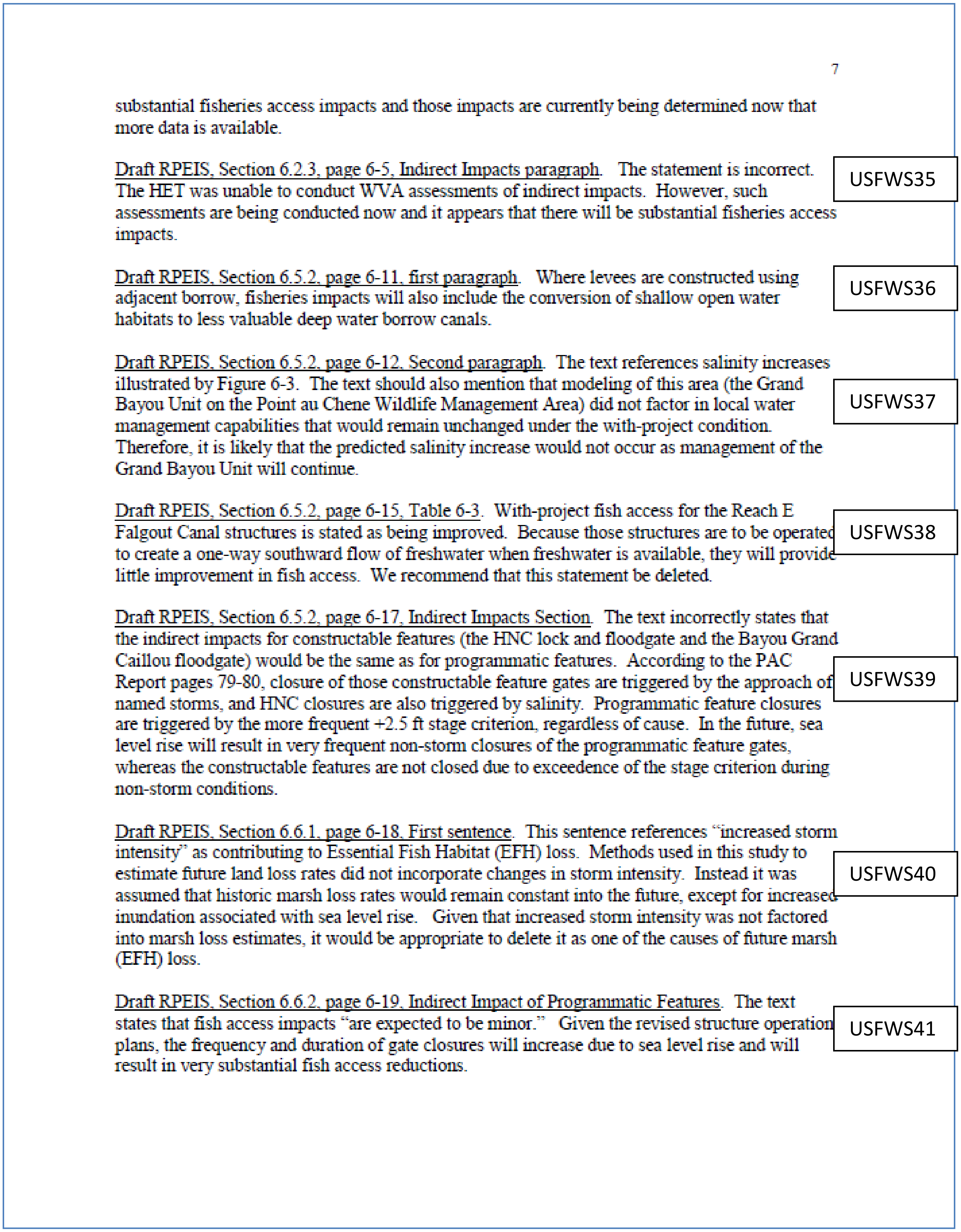
USFWS32

Draft RPEIS, Section 6.2.2, page 6-3, first paragraph. This paragraph states that the WVA was used to determine project impacts. Impacts for the constructable features and associated mitigation were determined using the WVA. However, for the remaining features, impacts were assessed in terms of wetland acres impacted. Estimates of indirect impacts of programmatic features are being prepared using the WVA method.

USFWS33

Draft RPEIS, Section 6.2.2, page 6-4, Indirect Impacts paragraph. The first sentence is confusing. The HET did determine that loss of wetlands enclosed within the levee system would remain unchanged. However, the HET was unable to conduct a WVA analysis of wetland enclosure impacts which would include fisheries access impact, because of insufficient data and schedule constraints. The HET, therefore, made a qualitative assessment that fisheries access impacts were likely small. However, that initial assessment was based upon an earlier and less restrictive structure operation plan, and the inability to quantify impacts due to insufficient data. However, it appears that the new more restrictive structure operation plan will result in rather

USFWS34



substantial fisheries access impacts and those impacts are currently being determined now that more data is available.

Draft RPEIS, Section 6.2.3, page 6-5, Indirect Impacts paragraph. The statement is incorrect. The HET was unable to conduct WVA assessments of indirect impacts. However, such assessments are being conducted now and it appears that there will be substantial fisheries access impacts.

USFWS35

Draft RPEIS, Section 6.5.2, page 6-11, first paragraph. Where levees are constructed using adjacent borrow, fisheries impacts will also include the conversion of shallow open water habitats to less valuable deep water borrow canals.

USFWS36

Draft RPEIS, Section 6.5.2, page 6-12, Second paragraph. The text references salinity increases illustrated by Figure 6-3. The text should also mention that modeling of this area (the Grand Bayou Unit on the Point au Chene Wildlife Management Area) did not factor in local water management capabilities that would remain unchanged under the with-project condition. Therefore, it is likely that the predicted salinity increase would not occur as management of the Grand Bayou Unit will continue.

USFWS37

Draft RPEIS, Section 6.5.2, page 6-15, Table 6-3. With-project fish access for the Reach E Falgout Canal structures is stated as being improved. Because those structures are to be operated to create a one-way southward flow of freshwater when freshwater is available, they will provide little improvement in fish access. We recommend that this statement be deleted.

USFWS38

Draft RPEIS, Section 6.5.2, page 6-17, Indirect Impacts Section. The text incorrectly states that the indirect impacts for constructable features (the HNC lock and floodgate and the Bayou Grand Caillou floodgate) would be the same as for programmatic features. According to the PAC Report pages 79-80, closure of those constructable feature gates are triggered by the approach of named storms, and HNC closures are also triggered by salinity. Programmatic feature closures are triggered by the more frequent +2.5 ft stage criterion, regardless of cause. In the future, sea level rise will result in very frequent non-storm closures of the programmatic feature gates, whereas the constructable features are not closed due to exceedence of the stage criterion during non-storm conditions.

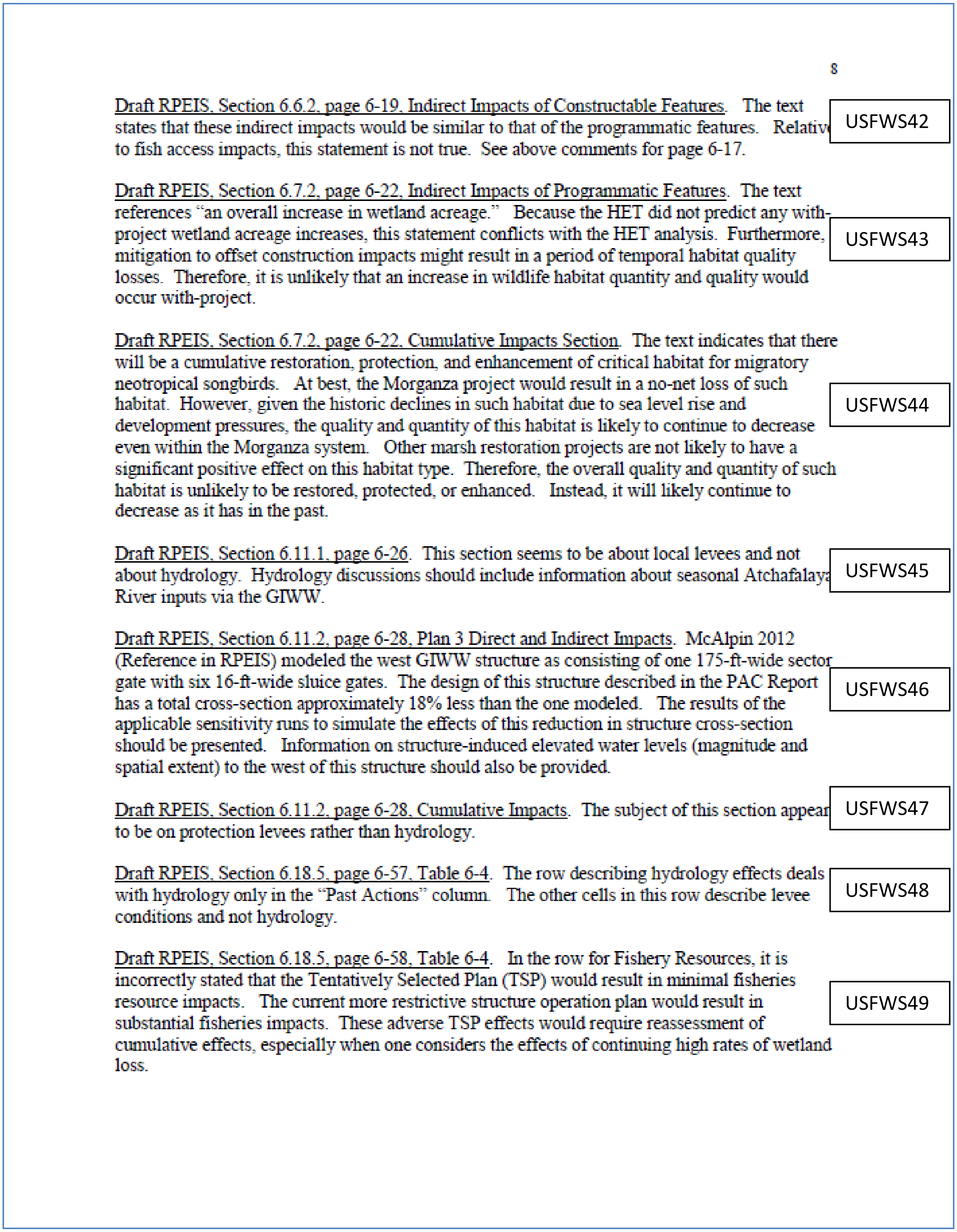
USFWS39

Draft RPEIS, Section 6.6.1, page 6-18, First sentence. This sentence references "increased storm intensity" as contributing to Essential Fish Habitat (EFH) loss. Methods used in this study to estimate future land loss rates did not incorporate changes in storm intensity. Instead it was assumed that historic marsh loss rates would remain constant into the future, except for increased inundation associated with sea level rise. Given that increased storm intensity was not factored into marsh loss estimates, it would be appropriate to delete it as one of the causes of future marsh (EFH) loss.

USFWS40

Draft RPEIS, Section 6.6.2, page 6-19, Indirect Impact of Programmatic Features. The text states that fish access impacts "are expected to be minor." Given the revised structure operation plans, the frequency and duration of gate closures will increase due to sea level rise and will result in very substantial fish access reductions.

USFWS41



Draft RPEIS, Section 6.6.2, page 6-19, Indirect Impacts of Constructable Features. The text states that these indirect impacts would be similar to that of the programmatic features. Relativ to fish access impacts, this statement is not true. See above comments for page 6-17.

USFWS42

Draft RPEIS, Section 6.7.2, page 6-22, Indirect Impacts of Programmatic Features. The text references "an overall increase in wetland acreage." Because the HET did not predict any with-project wetland acreage increases, this statement conflicts with the HET analysis. Furthermore, mitigation to offset construction impacts might result in a period of temporal habitat quality losses. Therefore, it is unlikely that an increase in wildlife habitat quantity and quality would occur with-project.

USFWS43

Draft RPEIS, Section 6.7.2, page 6-22, Cumulative Impacts Section. The text indicates that there will be a cumulative restoration, protection, and enhancement of critical habitat for migratory neotropical songbirds. At best, the Morganza project would result in a no-net loss of such habitat. However, given the historic declines in such habitat due to sea level rise and development pressures, the quality and quantity of this habitat is likely to continue to decrease even within the Morganza system. Other marsh restoration projects are not likely to have a significant positive effect on this habitat type. Therefore, the overall quality and quantity of such habitat is unlikely to be restored, protected, or enhanced. Instead, it will likely continue to decrease as it has in the past.

USFWS44

Draft RPEIS, Section 6.11.1, page 6-26. This section seems to be about local levees and not about hydrology. Hydrology discussions should include information about seasonal Atchafalay River inputs via the GIWW.

USFWS45

Draft RPEIS, Section 6.11.2, page 6-28, Plan 3 Direct and Indirect Impacts. McAlpin 2012 (Reference in RPEIS) modeled the west GIWW structure as consisting of one 175-ft-wide sector gate with six 16-ft-wide sluice gates. The design of this structure described in the PAC Report has a total cross-section approximately 18% less than the one modeled. The results of the applicable sensitivity runs to simulate the effects of this reduction in structure cross-section should be presented. Information on structure-induced elevated water levels (magnitude and spatial extent) to the west of this structure should also be provided.

USFWS46

Draft RPEIS, Section 6.11.2, page 6-28, Cumulative Impacts. The subject of this section appear to be on protection levees rather than hydrology.

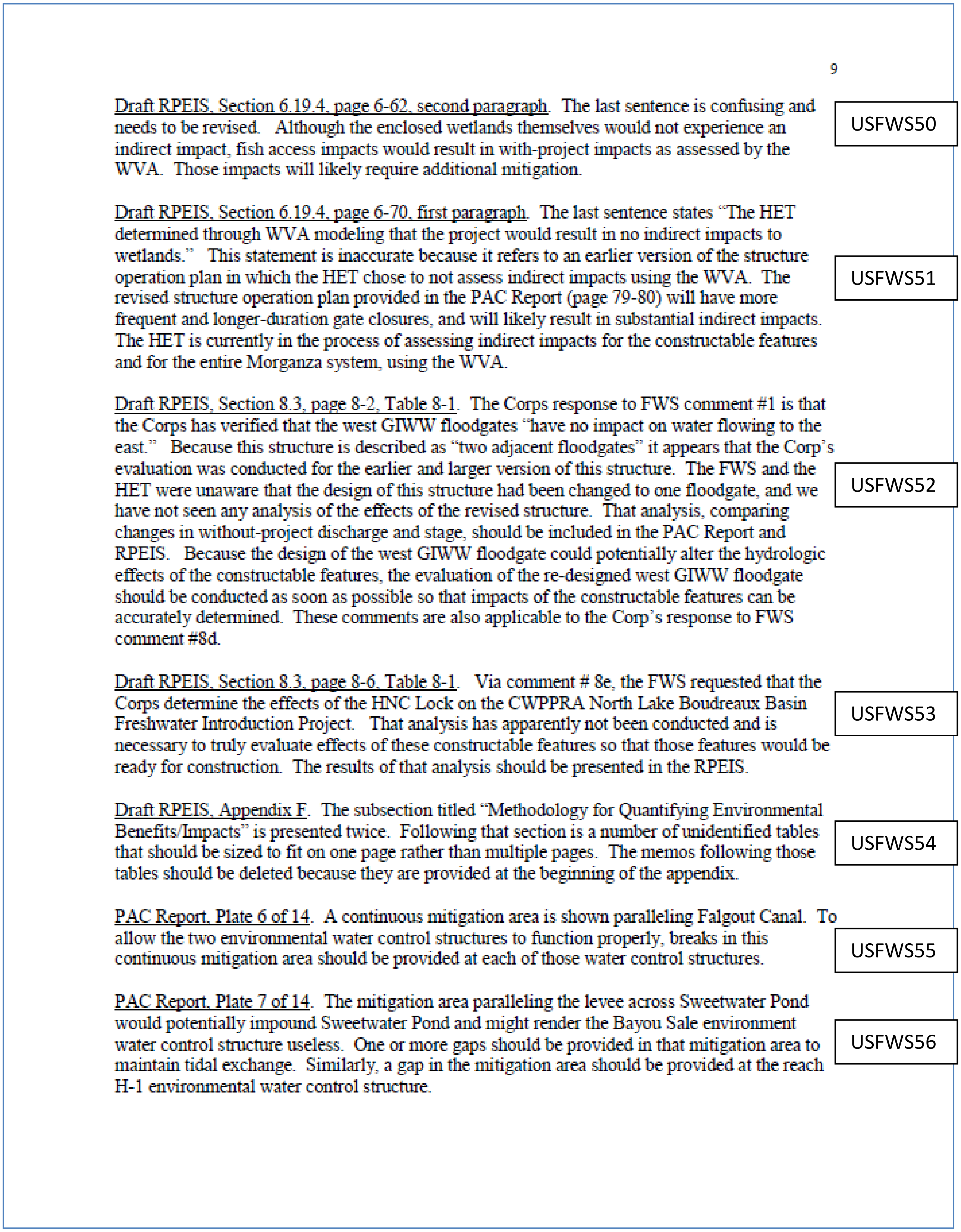
USFWS47

Draft RPEIS, Section 6.18.5, page 6-57, Table 6-4. The row describing hydrology effects deals with hydrology only in the "Past Actions" column. The other cells in this row describe levee conditions and not hydrology.

USFWS48

Draft RPEIS, Section 6.18.5, page 6-58, Table 6-4. In the row for Fishery Resources, it is incorrectly stated that the Tentatively Selected Plan (TSP) would result in minimal fisheries resource impacts. The current more restrictive structure operation plan would result in substantial fisheries impacts. These adverse TSP effects would require reassessment of cumulative effects, especially when one considers the effects of continuing high rates of wetland loss.

USFWS49



Draft RPEIS, Section 6.19.4, page 6-62, second paragraph. The last sentence is confusing and needs to be revised. Although the enclosed wetlands themselves would not experience an indirect impact, fish access impacts would result in with-project impacts as assessed by the WVA. Those impacts will likely require additional mitigation.

USFWS50

Draft RPEIS, Section 6.19.4, page 6-70, first paragraph. The last sentence states "The HET determined through WVA modeling that the project would result in no indirect impacts to wetlands." This statement is inaccurate because it refers to an earlier version of the structure operation plan in which the HET chose to not assess indirect impacts using the WVA. The revised structure operation plan provided in the PAC Report (page 79-80) will have more frequent and longer-duration gate closures, and will likely result in substantial indirect impacts. The HET is currently in the process of assessing indirect impacts for the constructable features and for the entire Morganza system, using the WVA.

USFWS51

Draft RPEIS, Section 8.3, page 8-2, Table 8-1. The Corps response to FWS comment #1 is that the Corps has verified that the west GIWW floodgates "have no impact on water flowing to the east." Because this structure is described as "two adjacent floodgates" it appears that the Corp's evaluation was conducted for the earlier and larger version of this structure. The FWS and the HET were unaware that the design of this structure had been changed to one floodgate, and we have not seen any analysis of the effects of the revised structure. That analysis, comparing changes in without-project discharge and stage, should be included in the PAC Report and RPEIS. Because the design of the west GIWW floodgate could potentially alter the hydrologic effects of the constructable features, the evaluation of the re-designed west GIWW floodgate should be conducted as soon as possible so that impacts of the constructable features can be accurately determined. These comments are also applicable to the Corp's response to FWS comment #8d.

USFWS52

Draft RPEIS, Section 8.3, page 8-6, Table 8-1. Via comment # 8e, the FWS requested that the Corps determine the effects of the HNC Lock on the CWPPRA North Lake Boudreaux Basin Freshwater Introduction Project. That analysis has apparently not been conducted and is necessary to truly evaluate effects of these constructable features so that those features would be ready for construction. The results of that analysis should be presented in the RPEIS.

USFWS53

Draft RPEIS, Appendix F. The subsection titled "Methodology for Quantifying Environmental Benefits/Impacts" is presented twice. Following that section is a number of unidentified tables that should be sized to fit on one page rather than multiple pages. The memos following those tables should be deleted because they are provided at the beginning of the appendix.

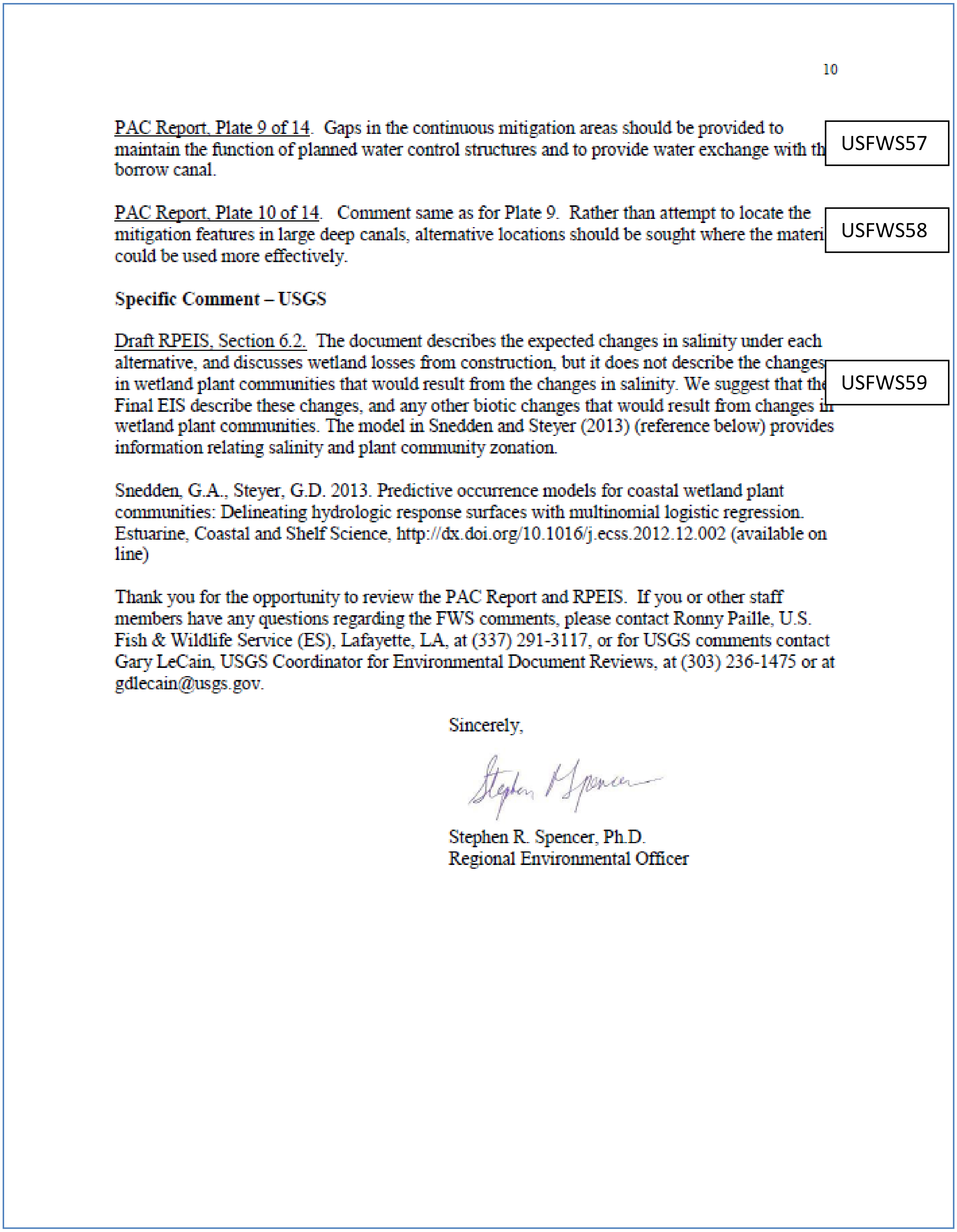
USFWS54

PAC Report, Plate 6 of 14. A continuous mitigation area is shown paralleling Falgout Canal. To allow the two environmental water control structures to function properly, breaks in this continuous mitigation area should be provided at each of those water control structures.

USFWS55

PAC Report, Plate 7 of 14. The mitigation area paralleling the levee across Sweetwater Pond would potentially impound Sweetwater Pond and might render the Bayou Sale environment water control structure useless. One or more gaps should be provided in that mitigation area to maintain tidal exchange. Similarly, a gap in the mitigation area should be provided at the reach H-1 environmental water control structure.

USFWS56



PAC Report, Plate 9 of 14. Gaps in the continuous mitigation areas should be provided to maintain the function of planned water control structures and to provide water exchange with th borrow canal.

USFWS57

PAC Report, Plate 10 of 14. Comment same as for Plate 9. Rather than attempt to locate the mitigation features in large deep canals, alternative locations should be sought where the materi could be used more effectively.

USFWS58

Specific Comment – USGS

Draft RPEIS, Section 6.2. The document describes the expected changes in salinity under each alternative, and discusses wetland losses from construction, but it does not describe the changes in wetland plant communities that would result from the changes in salinity. We suggest that th Final EIS describe these changes, and any other biotic changes that would result from changes i wetland plant communities. The model in Snedden and Steyer (2013) (reference below) provides information relating salinity and plant community zonation.

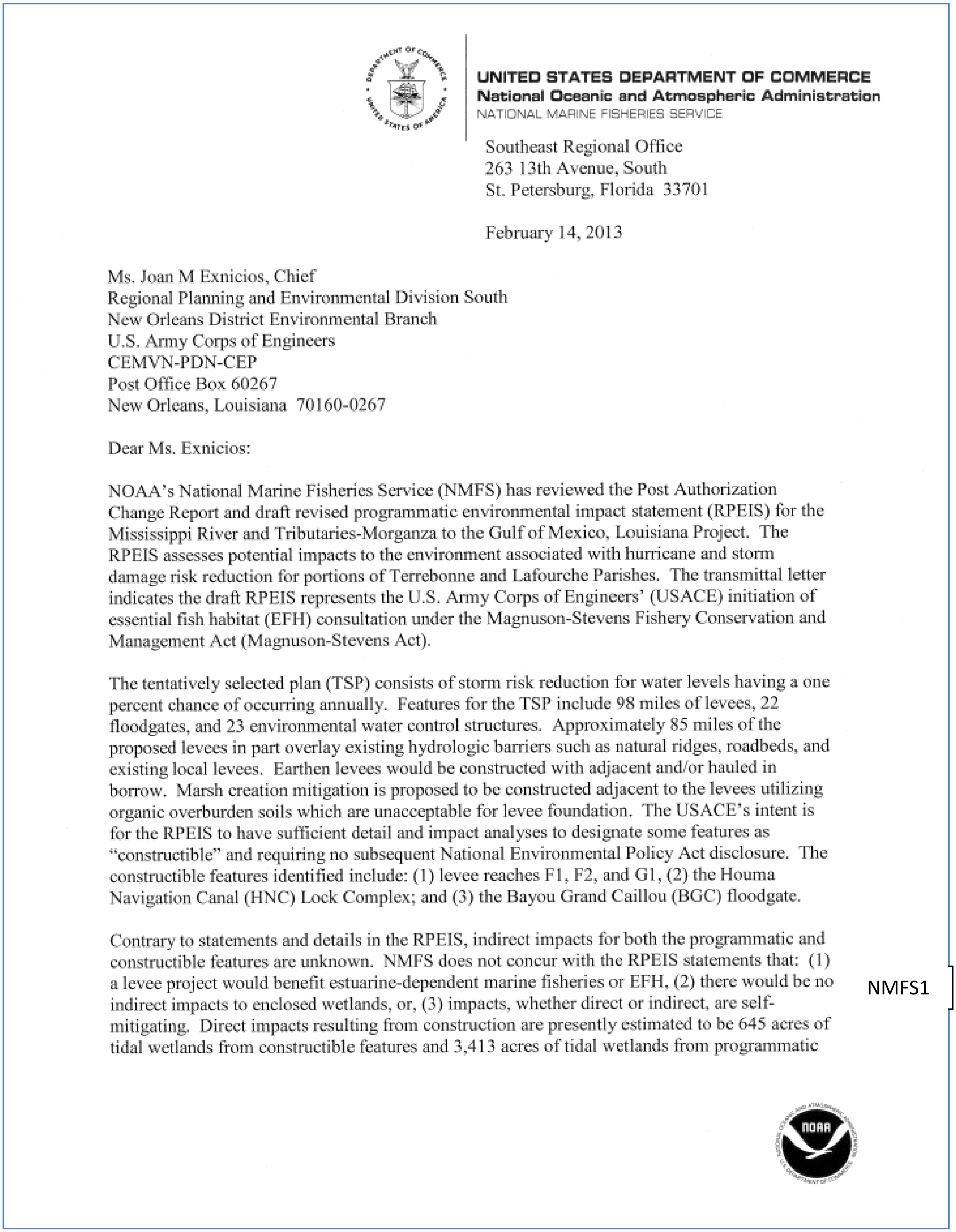
USFWS59

Snedden, G.A., Steyer, G.D. 2013. Predictive occurrence models for coastal wetland plant communities: Delineating hydrologic response surfaces with multinomial logistic regression. Estuarine, Coastal and Shelf Science, http://dx.doi.org/10.1016/j.ecss.2012.12.002 (available on line)

Thank you for the opportunity to review the PAC Report and RPEIS. If you or other staff members have any questions regarding the FWS comments, please contact Ronny Paille, U.S. Fish & Wildlife Service (ES), Lafayette, LA, at (337) 291-3117, or for USGS comments contact Gary LeCain, USGS Coordinator for Environmental Document Reviews, at (303) 236-1475 or at gdlecain@usgs.gov.

Sincerely,

Stephen R. Spencer, Ph.D.
Regional Environmental Officer



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

February 14, 2013

Ms. Joan M Exnicios, Chief
Regional Planning and Environmental Division South
New Orleans District Environmental Branch
U.S. Army Corps of Engineers
CEMVN-PDN-CEP
Post Office Box 60267
New Orleans, Louisiana 70160-0267

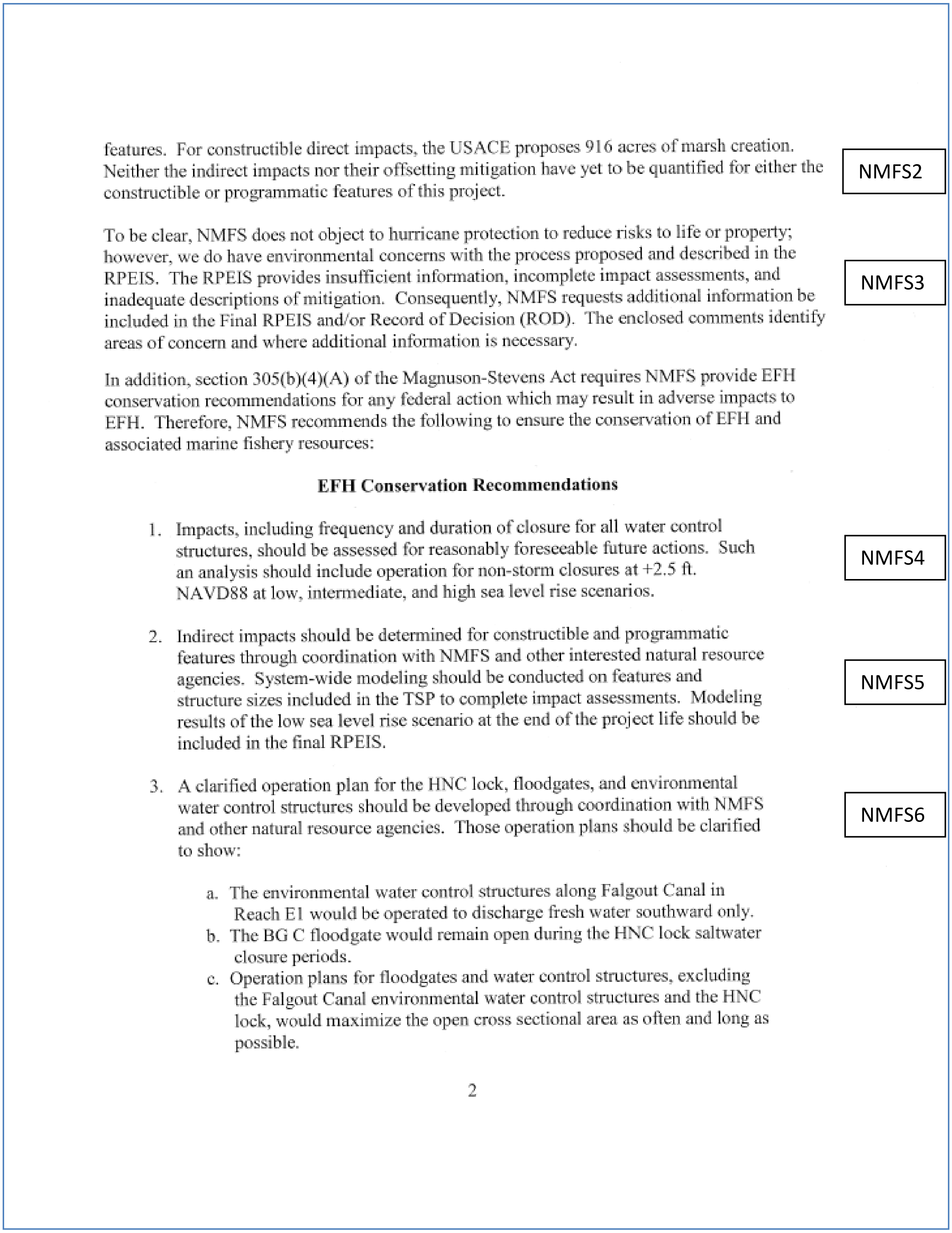
Dear Ms. Exnicios:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the Post Authorization Change Report and draft revised programmatic environmental impact statement (RPEIS) for the Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana Project. The RPEIS assesses potential impacts to the environment associated with hurricane and storm damage risk reduction for portions of Terrebonne and Lafourche Parishes. The transmittal letter indicates the draft RPEIS represents the U.S. Army Corps of Engineers' (USACE) initiation of essential fish habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

The tentatively selected plan (TSP) consists of storm risk reduction for water levels having a one percent chance of occurring annually. Features for the TSP include 98 miles of levees, 22 floodgates, and 23 environmental water control structures. Approximately 85 miles of the proposed levees in part overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing local levees. Earthen levees would be constructed with adjacent and/or hauled in borrow. Marsh creation mitigation is proposed to be constructed adjacent to the levees utilizing organic overburden soils which are unacceptable for levee foundation. The USACE's intent is for the RPEIS to have sufficient detail and impact analyses to designate some features as "constructible" and requiring no subsequent National Environmental Policy Act disclosure. The constructible features identified include: (1) levee reaches F1, F2, and G1, (2) the Houma Navigation Canal (HNC) Lock Complex; and (3) the Bayou Grand Caillou (BGC) floodgate.

Contrary to statements and details in the RPEIS, indirect impacts for both the programmatic and constructible features are unknown. NMFS does not concur with the RPEIS statements that: (1) a levee project would benefit estuarine-dependent marine fisheries or EFH, (2) there would be no indirect impacts to enclosed wetlands, or, (3) impacts, whether direct or indirect, are self-mitigating. Direct impacts resulting from construction are presently estimated to be 645 acres of tidal wetlands from constructible features and 3,413 acres of tidal wetlands from programmatic

NMFS1



features. For constructible direct impacts, the USACE proposes 916 acres of marsh creation. Neither the indirect impacts nor their offsetting mitigation have yet to be quantified for either the constructible or programmatic features of this project.

NMFS2

To be clear, NMFS does not object to hurricane protection to reduce risks to life or property; however, we do have environmental concerns with the process proposed and described in the RPEIS. The RPEIS provides insufficient information, incomplete impact assessments, and inadequate descriptions of mitigation. Consequently, NMFS requests additional information be included in the Final RPEIS and/or Record of Decision (ROD). The enclosed comments identify areas of concern and where additional information is necessary.

NMFS3

In addition, section 305(b)(4)(A) of the Magnuson-Stevens Act requires NMFS provide EFH conservation recommendations for any federal action which may result in adverse impacts to EFH. Therefore, NMFS recommends the following to ensure the conservation of EFH and associated marine fishery resources:

EFH Conservation Recommendations

1. Impacts, including frequency and duration of closure for all water control structures, should be assessed for reasonably foreseeable future actions. Such an analysis should include operation for non-storm closures at +2.5 ft. NAVD88 at low, intermediate, and high sea level rise scenarios.

NMFS4

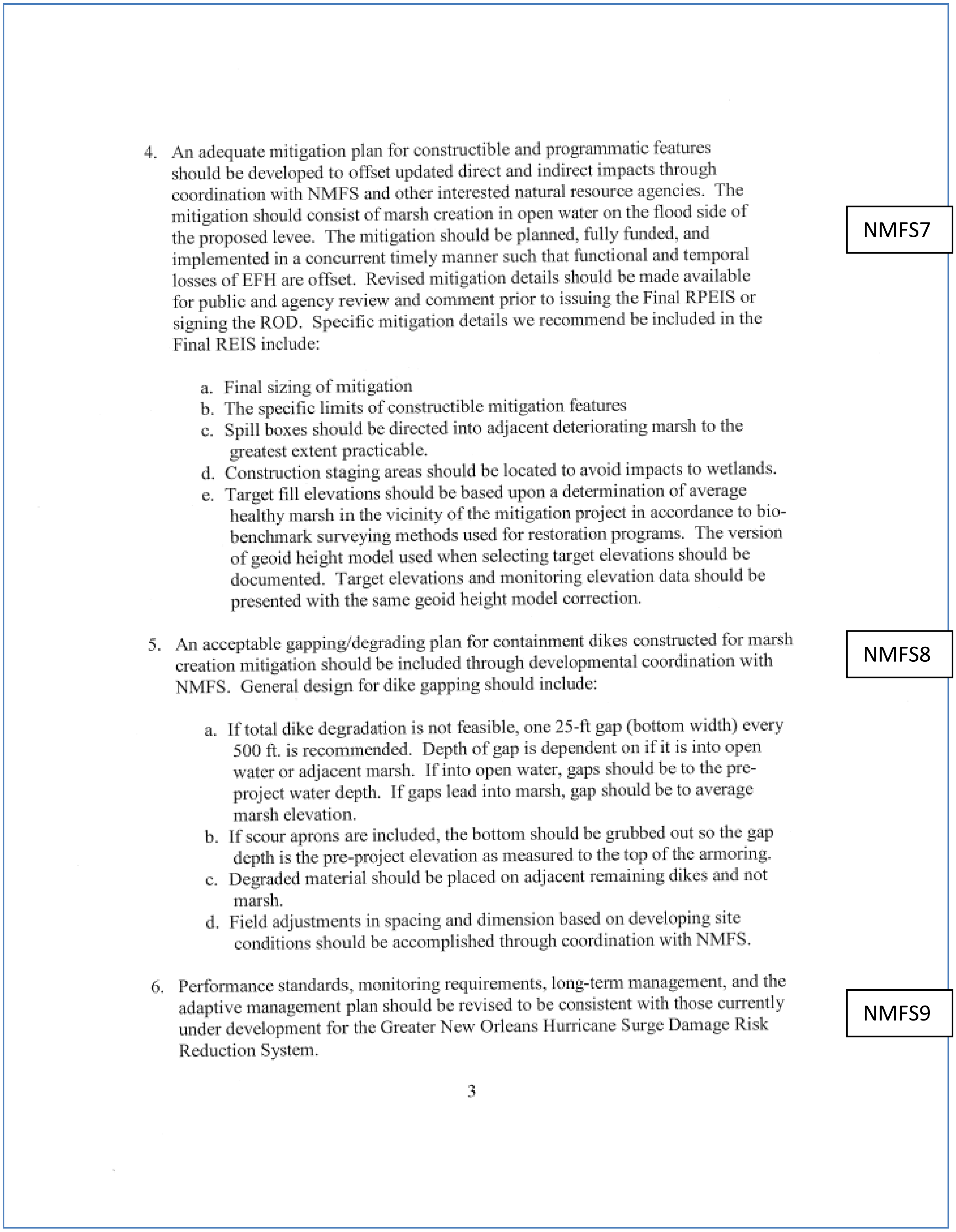
2. Indirect impacts should be determined for constructible and programmatic features through coordination with NMFS and other interested natural resource agencies. System-wide modeling should be conducted on features and structure sizes included in the TSP to complete impact assessments. Modeling results of the low sea level rise scenario at the end of the project life should be included in the final RPEIS.

NMFS5

3. A clarified operation plan for the HNC lock, floodgates, and environmental water control structures should be developed through coordination with NMFS and other natural resource agencies. Those operation plans should be clarified to show:

NMFS6

   a. The environmental water control structures along Falgout Canal in Reach E1 would be operated to discharge fresh water southward only.
   b. The BG C floodgate would remain open during the HNC lock saltwater closure periods.
   c. Operation plans for floodgates and water control structures, excluding the Falgout Canal environmental water control structures and the HNC lock, would maximize the open cross sectional area as often and long as possible.



4. An adequate mitigation plan for constructible and programmatic features should be developed to offset updated direct and indirect impacts through coordination with NMFS and other interested natural resource agencies. The mitigation should consist of marsh creation in open water on the flood side of the proposed levee. The mitigation should be planned, fully funded, and implemented in a concurrent timely manner such that functional and temporal losses of EFH are offset. Revised mitigation details should be made available for public and agency review and comment prior to issuing the Final RPEIS or signing the ROD. Specific mitigation details we recommend be included in the Final REIS include:

   a. Final sizing of mitigation
   b. The specific limits of constructible mitigation features
   c. Spill boxes should be directed into adjacent deteriorating marsh to the greatest extent practicable.
   d. Construction staging areas should be located to avoid impacts to wetlands.
   e. Target fill elevations should be based upon a determination of average healthy marsh in the vicinity of the mitigation project in accordance to bio-benchmark surveying methods used for restoration programs. The version of geoid height model used when selecting target elevations should be documented. Target elevations and monitoring elevation data should be presented with the same geoid height model correction.

NMFS7

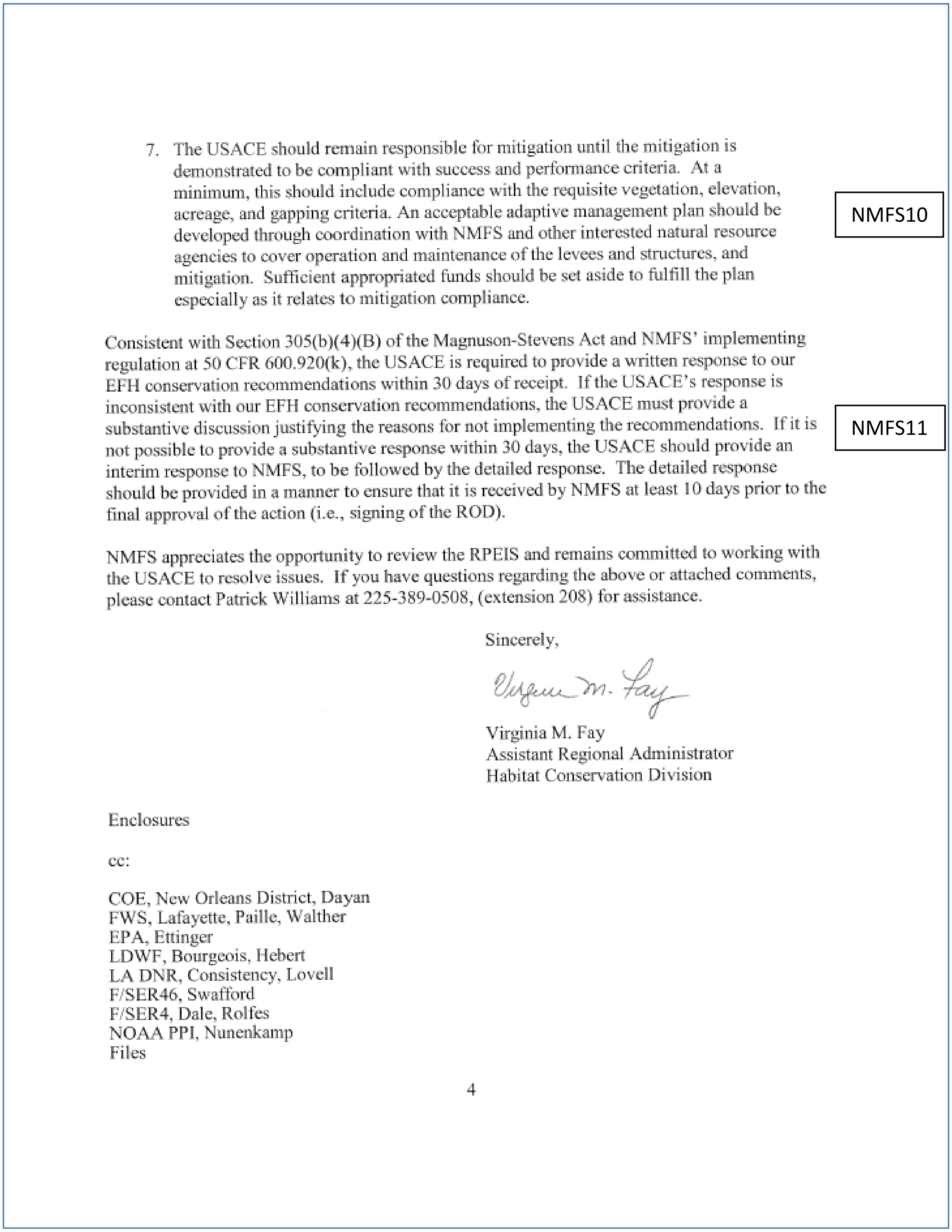
5. An acceptable gapping/degrading plan for containment dikes constructed for marsh creation mitigation should be included through developmental coordination with NMFS. General design for dike gapping should include:

   a. If total dike degradation is not feasible, one 25-ft gap (bottom width) every 500 ft. is recommended. Depth of gap is dependent on if it is into open water or adjacent marsh. If into open water, gaps should be to the pre-project water depth. If gaps lead into marsh, gap should be to average marsh elevation.
   b. If scour aprons are included, the bottom should be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.
   c. Degraded material should be placed on adjacent remaining dikes and not marsh.
   d. Field adjustments in spacing and dimension based on developing site conditions should be accomplished through coordination with NMFS.

NMFS8

6. Performance standards, monitoring requirements, long-term management, and the adaptive management plan should be revised to be consistent with those currently under development for the Greater New Orleans Hurricane Surge Damage Risk Reduction System.

NMFS9



7. The USACE should remain responsible for mitigation until the mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria. An acceptable adaptive management plan should be developed through coordination with NMFS and other interested natural resource agencies to cover operation and maintenance of the levees and structures, and mitigation. Sufficient appropriated funds should be set aside to fulfill the plan especially as it relates to mitigation compliance.

NMFS10

Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Act and NMFS' implementing regulation at 50 CFR 600.920(k), the USACE is required to provide a written response to our EFH conservation recommendations within 30 days of receipt. If the USACE's response is inconsistent with our EFH conservation recommendations, the USACE must provide a substantive discussion justifying the reasons for not implementing the recommendations. If it is not possible to provide a substantive response within 30 days, the USACE should provide an interim response to NMFS, to be followed by the detailed response. The detailed response should be provided in a manner to ensure that it is received by NMFS at least 10 days prior to the final approval of the action (i.e., signing of the ROD).

NMFS11

NMFS appreciates the opportunity to review the RPEIS and remains committed to working with the USACE to resolve issues. If you have questions regarding the above or attached comments, please contact Patrick Williams at 225-389-0508, (extension 208) for assistance.

Sincerely,

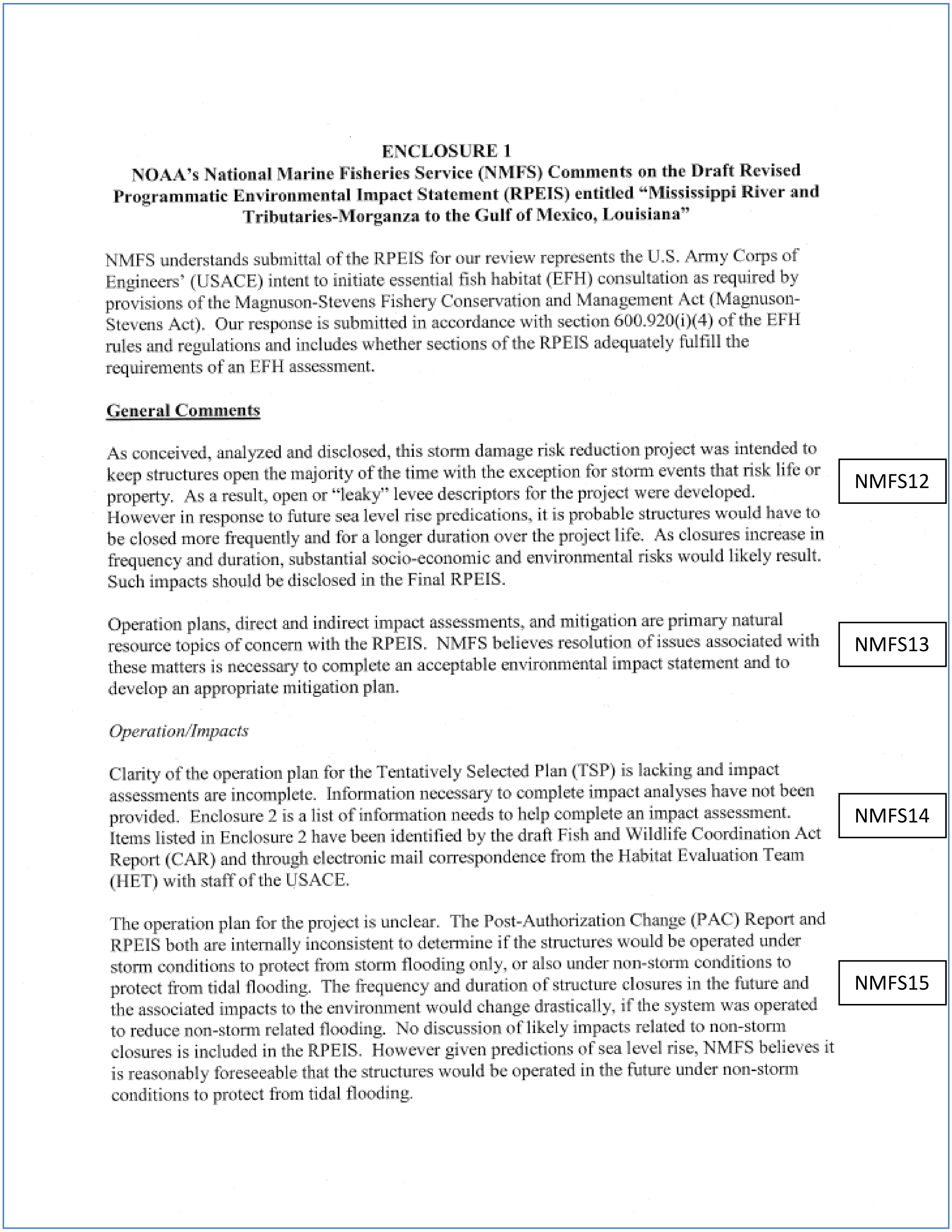
Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

Enclosures

cc:

COE, New Orleans District, Dayan
FWS, Lafayette, Paille, Walther
EPA, Ettinger
LDWF, Bourgeois, Hebert
LA DNR, Consistency, Lovell
F/SER46, Swafford
F/SER4, Dale, Rolfes
NOAA PPI, Nunenkamp
Files



ENCLOSURE 1

NOAA's National Marine Fisheries Service (NMFS) Comments on the Draft Revised Programmatic Environmental Impact Statement (RPEIS) entitled "Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana"

NMFS understands submittal of the RPEIS for our review represents the U.S. Army Corps of Engineers' (USACE) intent to initiate essential fish habitat (EFH) consultation as required by provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Our response is submitted in accordance with section 600.920(i)(4) of the EFH rules and regulations and includes whether sections of the RPEIS adequately fulfill the requirements of an EFH assessment.

General Comments

As conceived, analyzed and disclosed, this storm damage risk reduction project was intended to keep structures open the majority of the time with the exception for storm events that risk life or property. As a result, open or "leaky" levee descriptors for the project were developed. However in response to future sea level rise predications, it is probable structures would have to be closed more frequently and for a longer duration over the project life. As closures increase in frequency and duration, substantial socio-economic and environmental risks would likely result. Such impacts should be disclosed in the Final RPEIS.

NMFS12

Operation plans, direct and indirect impact assessments, and mitigation are primary natural resource topics of concern with the RPEIS. NMFS believes resolution of issues associated with these matters is necessary to complete an acceptable environmental impact statement and to develop an appropriate mitigation plan.

NMFS13

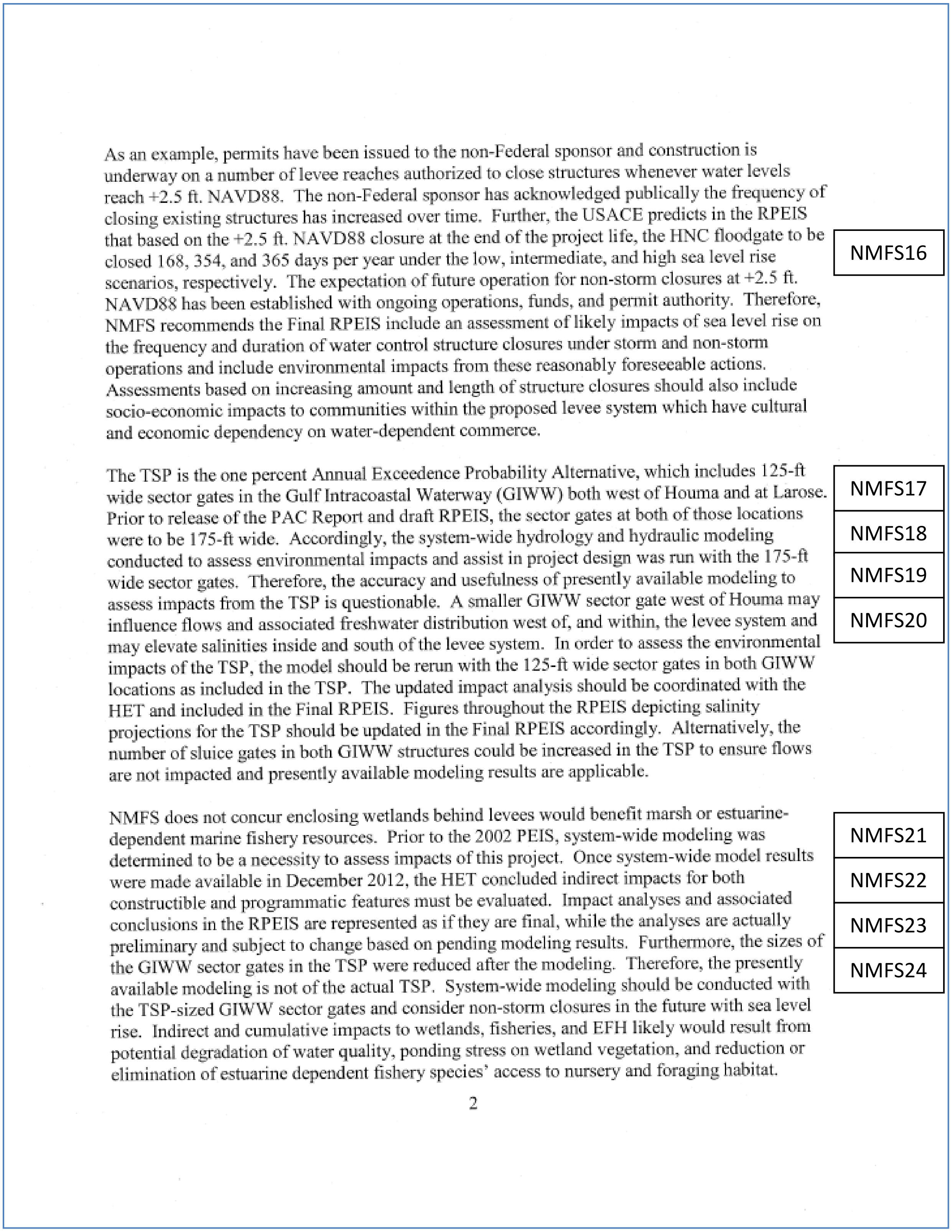
Operation/Impacts

Clarity of the operation plan for the Tentatively Selected Plan (TSP) is lacking and impact assessments are incomplete. Information necessary to complete impact analyses have not been provided. Enclosure 2 is a list of information needs to help complete an impact assessment. Items listed in Enclosure 2 have been identified by the draft Fish and Wildlife Coordination Act Report (CAR) and through electronic mail correspondence from the Habitat Evaluation Team (HET) with staff of the USACE.

NMFS14

The operation plan for the project is unclear. The Post-Authorization Change (PAC) Report and RPEIS both are internally inconsistent to determine if the structures would be operated under storm conditions to protect from storm flooding only, or also under non-storm conditions to protect from tidal flooding. The frequency and duration of structure closures in the future and the associated impacts to the environment would change drastically, if the system was operated to reduce non-storm related flooding. No discussion of likely impacts related to non-storm closures is included in the RPEIS. However given predictions of sea level rise, NMFS believes it is reasonably foreseeable that the structures would be operated in the future under non-storm conditions to protect from tidal flooding.

NMFS15



As an example, permits have been issued to the non-Federal sponsor and construction is underway on a number of levee reaches authorized to close structures whenever water levels reach +2.5 ft. NAVD88. The non-Federal sponsor has acknowledged publically the frequency of closing existing structures has increased over time. Further, the USACE predicts in the RPEIS that based on the +2.5 ft. NAVD88 closure at the end of the project life, the HNC floodgate to be closed 168, 354, and 365 days per year under the low, intermediate, and high sea level rise scenarios, respectively. The expectation of future operation for non-storm closures at +2.5 ft. NAVD88 has been established with ongoing operations, funds, and permit authority. Therefore, NMFS recommends the Final RPEIS include an assessment of likely impacts of sea level rise on the frequency and duration of water control structure closures under storm and non-storm operations and include environmental impacts from these reasonably foreseeable actions. Assessments based on increasing amount and length of structure closures should also include socio-economic impacts to communities within the proposed levee system which have cultural and economic dependency on water-dependent commerce.

NMFS16

The TSP is the one percent Annual Exceedence Probability Alternative, which includes 125-ft wide sector gates in the Gulf Intracoastal Waterway (GIWW) both west of Houma and at Larose. Prior to release of the PAC Report and draft RPEIS, the sector gates at both of those locations were to be 175-ft wide. Accordingly, the system-wide hydrology and hydraulic modeling conducted to assess environmental impacts and assist in project design was run with the 175-ft wide sector gates. Therefore, the accuracy and usefulness of presently available modeling to assess impacts from the TSP is questionable. A smaller GIWW sector gate west of Houma may influence flows and associated freshwater distribution west of, and within, the levee system and may elevate salinities inside and south of the levee system. In order to assess the environmental impacts of the TSP, the model should be rerun with the 125-ft wide sector gates in both GIWW locations as included in the TSP. The updated impact analysis should be coordinated with the HET and included in the Final RPEIS. Figures throughout the RPEIS depicting salinity projections for the TSP should be updated in the Final RPEIS accordingly. Alternatively, the number of sluice gates in both GIWW structures could be increased in the TSP to ensure flows are not impacted and presently available modeling results are applicable.

NMFS17

NMFS18

NMFS19

NMFS20

NMFS does not concur enclosing wetlands behind levees would benefit marsh or estuarine-dependent marine fishery resources. Prior to the 2002 PEIS, system-wide modeling was determined to be a necessity to assess impacts of this project. Once system-wide model results were made available in December 2012, the HET concluded indirect impacts for both constructible and programmatic features must be evaluated. Impact analyses and associated conclusions in the RPEIS are represented as if they are final, while the analyses are actually preliminary and subject to change based on pending modeling results. Furthermore, the sizes of the GIWW sector gates in the TSP were reduced after the modeling. Therefore, the presently available modeling is not of the actual TSP. System-wide modeling should be conducted with the TSP-sized GIWW sector gates and consider non-storm closures in the future with sea level rise. Indirect and cumulative impacts to wetlands, fisheries, and EFH likely would result from potential degradation of water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine dependent fishery species' access to nursery and foraging habitat.

NMFS21

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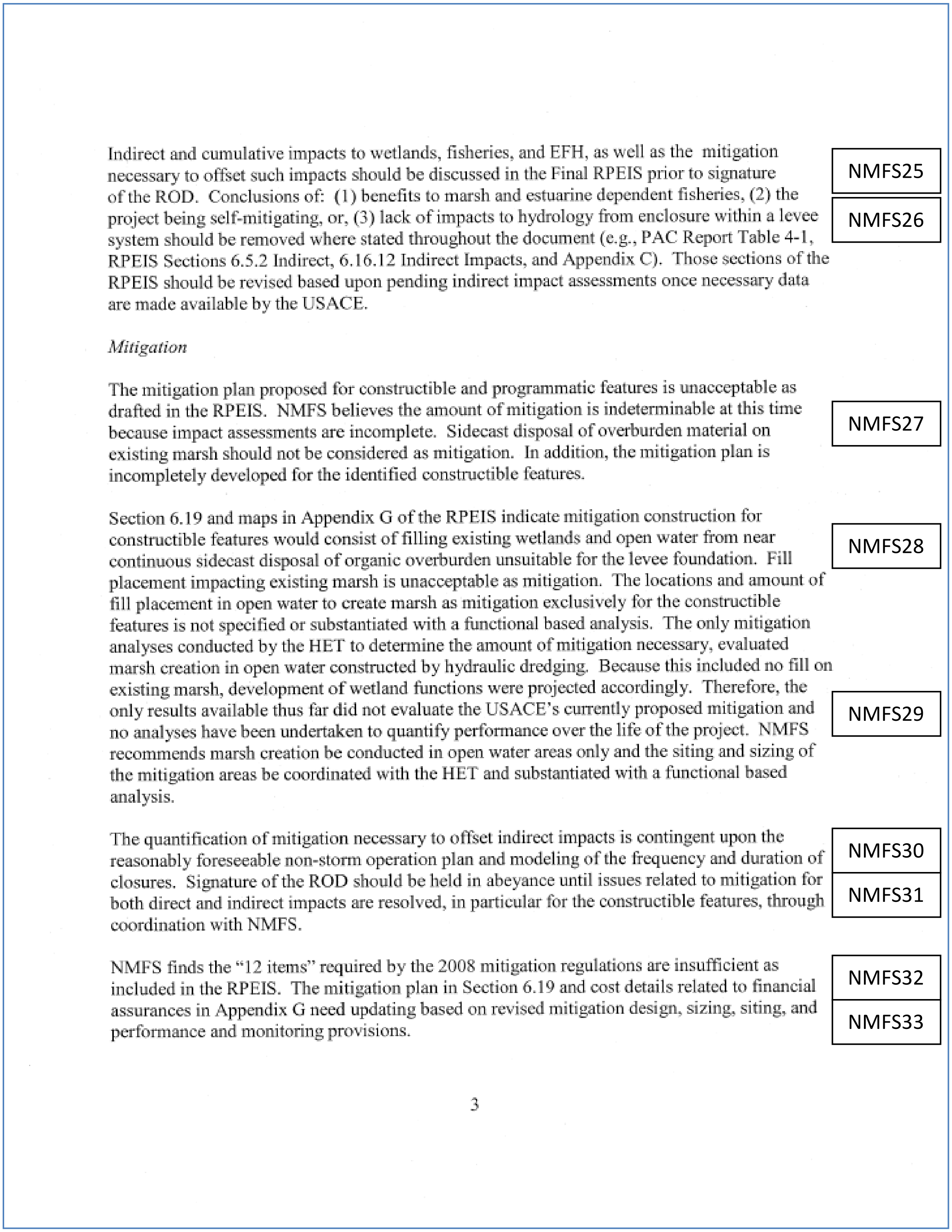
NMFS23

NMFS24



Indirect and cumulative impacts to wetlands, fisheries, and EFH, as well as the mitigation necessary to offset such impacts should be discussed in the Final RPEIS prior to signature of the ROD. Conclusions of: (1) benefits to marsh and estuarine dependent fisheries, (2) the project being self-mitigating, or, (3) lack of impacts to hydrology from enclosure within a levee system should be removed where stated throughout the document (e.g., PAC Report Table 4-1, RPEIS Sections 6.5.2 Indirect, 6.16.12 Indirect Impacts, and Appendix C). Those sections of the RPEIS should be revised based upon pending indirect impact assessments once necessary data are made available by the USACE.

NMFS25

NMFS26

Mitigation

The mitigation plan proposed for constructible and programmatic features is unacceptable as drafted in the RPEIS. NMFS believes the amount of mitigation is indeterminable at this time because impact assessments are incomplete. Sidecast disposal of overburden material on existing marsh should not be considered as mitigation. In addition, the mitigation plan is incompletely developed for the identified constructible features.

NMFS27

Section 6.19 and maps in Appendix G of the RPEIS indicate mitigation construction for constructible features would consist of filling existing wetlands and open water from near continuous sidecast disposal of organic overburden unsuitable for the levee foundation. Fill placement impacting existing marsh is unacceptable as mitigation. The locations and amount of fill placement in open water to create marsh as mitigation exclusively for the constructible features is not specified or substantiated with a functional based analysis. The only mitigation analyses conducted by the HET to determine the amount of mitigation necessary, evaluated marsh creation in open water constructed by hydraulic dredging. Because this included no fill on existing marsh, development of wetland functions were projected accordingly. Therefore, the only results available thus far did not evaluate the USACE's currently proposed mitigation and no analyses have been undertaken to quantify performance over the life of the project. NMFS recommends marsh creation be conducted in open water areas only and the siting and sizing of the mitigation areas be coordinated with the HET and substantiated with a functional based analysis.

NMFS28

NMFS29

The quantification of mitigation necessary to offset indirect impacts is contingent upon the reasonably foreseeable non-storm operation plan and modeling of the frequency and duration of closures. Signature of the ROD should be held in abeyance until issues related to mitigation for both direct and indirect impacts are resolved, in particular for the constructible features, through coordination with NMFS.

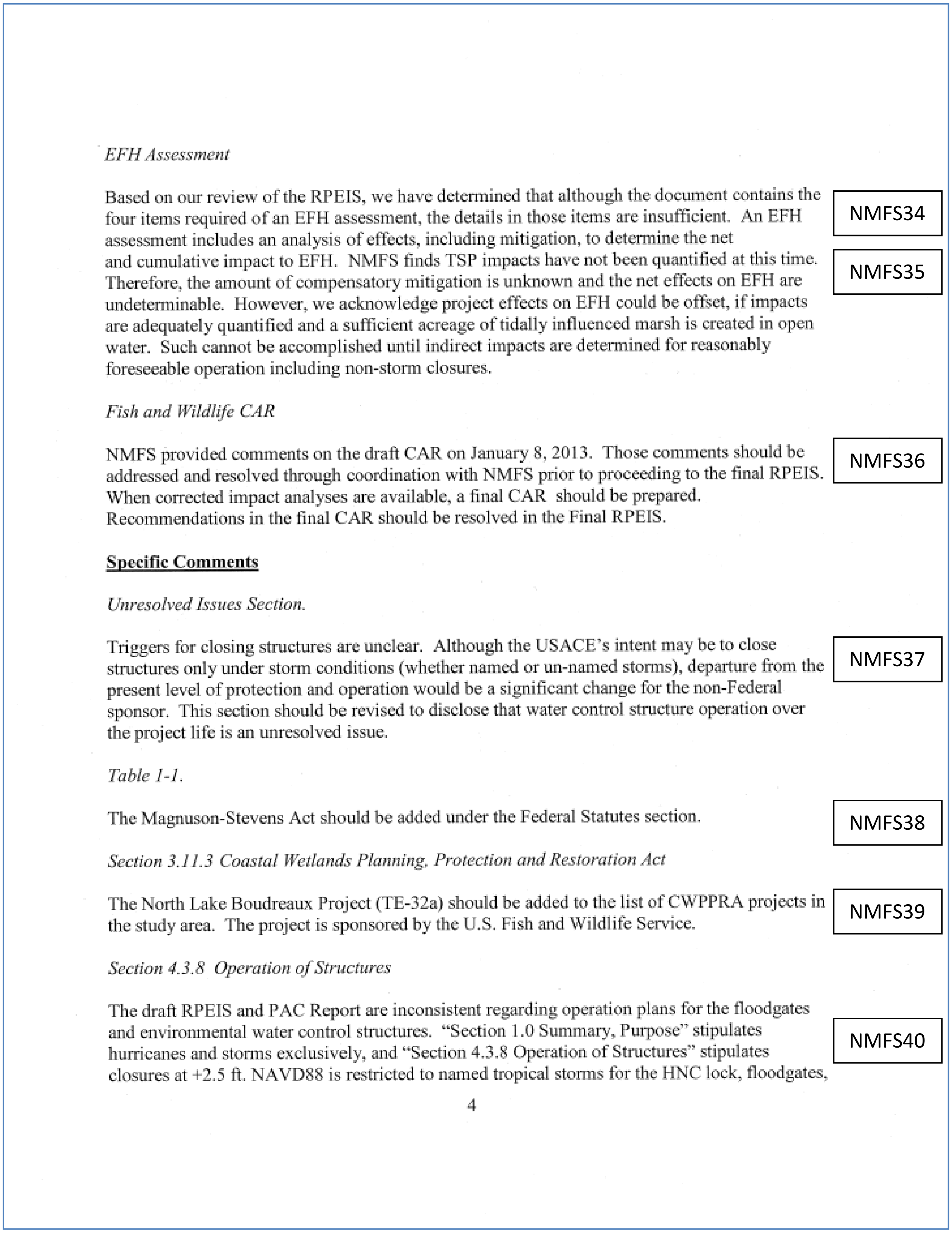
NMFS30

NMFS31

NMFS finds the "12 items" required by the 2008 mitigation regulations are insufficient as included in the RPEIS. The mitigation plan in Section 6.19 and cost details related to financial assurances in Appendix G need updating based on revised mitigation design, sizing, siting, and performance and monitoring provisions.

NMFS32

NMFS33



EFH Assessment

Based on our review of the RPEIS, we have determined that although the document contains the
four items required of an EFH assessment, the details in those items are insufficient. An EFH NMFS34
assessment includes an analysis of effects, including mitigation, to determine the net
and cumulative impact to EFH. NMFS finds TSP impacts have not been quantified at this time.
Therefore, the amount of compensatory mitigation is unknown and the net effects on EFH are NMFS35
undeterminable. However, we acknowledge project effects on EFH could be offset, if impacts
are adequately quantified and a sufficient acreage of tidally influenced marsh is created in open
water. Such cannot be accomplished until indirect impacts are determined for reasonably
foreseeable operation including non-storm closures.

Fish and Wildlife CAR

NMFS provided comments on the draft CAR on January 8, 2013. Those comments should be
addressed and resolved through coordination with NMFS prior to proceeding to the final RPEIS. NMFS36
When corrected impact analyses are available, a final CAR should be prepared.
Recommendations in the final CAR should be resolved in the Final RPEIS.

<u>Specific Comments</u>

Unresolved Issues Section.

Triggers for closing structures are unclear. Although the USACE's intent may be to close
structures only under storm conditions (whether named or un-named storms), departure from the NMFS37
present level of protection and operation would be a significant change for the non-Federal
sponsor. This section should be revised to disclose that water control structure operation over
the project life is an unresolved issue.

Table 1-1.

The Magnuson-Stevens Act should be added under the Federal Statutes section. NMFS38

Section 3.11.3 Coastal Wetlands Planning, Protection and Restoration Act

The North Lake Boudreaux Project (TE-32a) should be added to the list of CWPPRA projects in NMFS39
the study area. The project is sponsored by the U.S. Fish and Wildlife Service.

Section 4.3.8 Operation of Structures

The draft RPEIS and PAC Report are inconsistent regarding operation plans for the floodgates
and environmental water control structures. "Section 1.0 Summary, Purpose" stipulates
hurricanes and storms exclusively, and "Section 4.3.8 Operation of Structures" stipulates NMFS40
closures at +2.5 ft. NAVD88 is restricted to named tropical storms for the HNC lock, floodgates,

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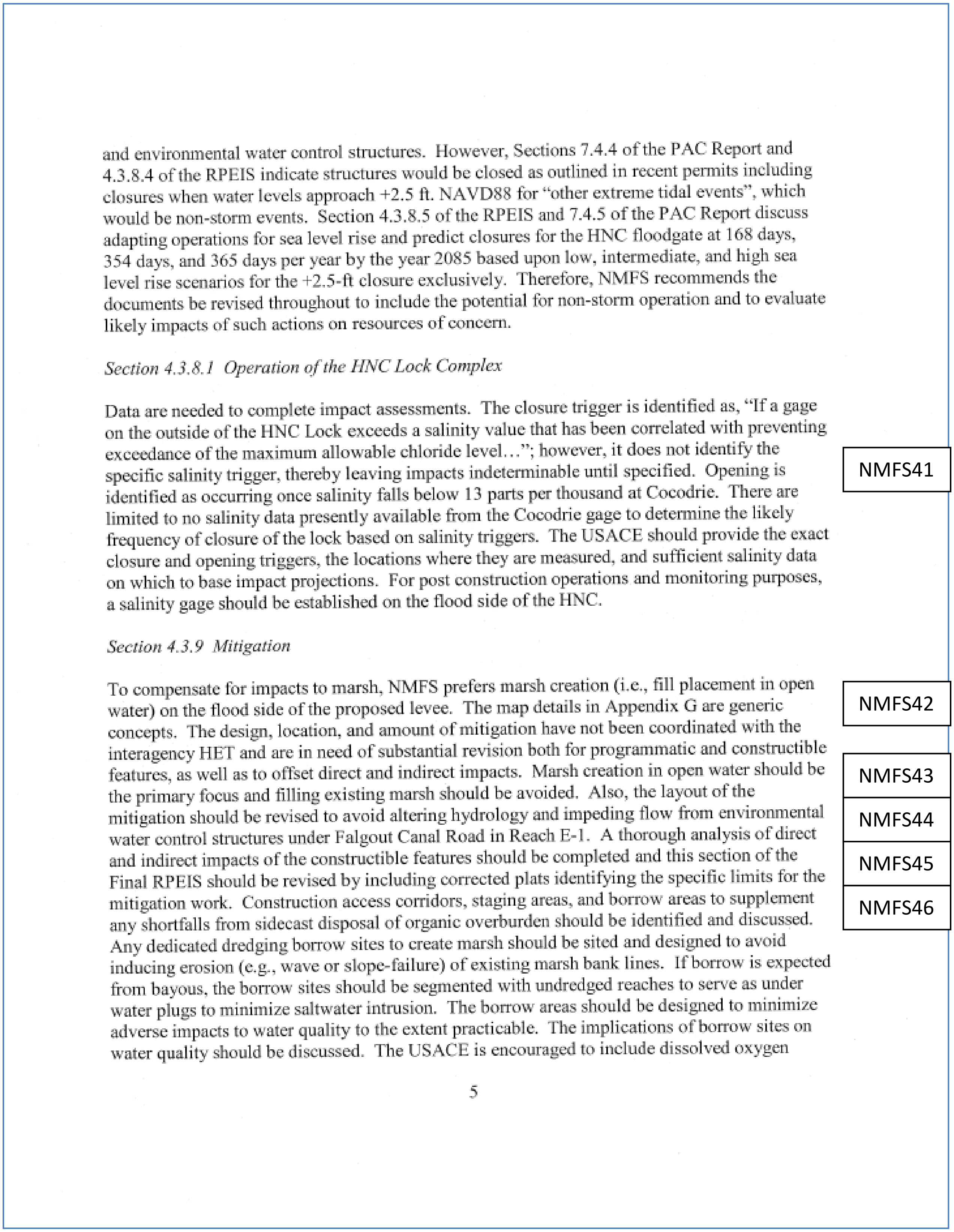


and environmental water control structures. However, Sections 7.4.4 of the PAC Report and 4.3.8.4 of the RPEIS indicate structures would be closed as outlined in recent permits including closures when water levels approach +2.5 ft. NAVD88 for "other extreme tidal events", which would be non-storm events. Section 4.3.8.5 of the RPEIS and 7.4.5 of the PAC Report discuss adapting operations for sea level rise and predict closures for the HNC floodgate at 168 days, 354 days, and 365 days per year by the year 2085 based upon low, intermediate, and high sea level rise scenarios for the +2.5-ft closure exclusively. Therefore, NMFS recommends the documents be revised throughout to include the potential for non-storm operation and to evaluate likely impacts of such actions on resources of concern.

Section 4.3.8.1 Operation of the HNC Lock Complex

Data are needed to complete impact assessments. The closure trigger is identified as, "If a gage on the outside of the HNC Lock exceeds a salinity value that has been correlated with preventing exceedance of the maximum allowable chloride level…"; however, it does not identify the specific salinity trigger, thereby leaving impacts indeterminable until specified. Opening is identified as occurring once salinity falls below 13 parts per thousand at Cocodrie. There are limited to no salinity data presently available from the Cocodrie gage to determine the likely frequency of closure of the lock based on salinity triggers. The USACE should provide the exact closure and opening triggers, the locations where they are measured, and sufficient salinity data on which to base impact projections. For post construction operations and monitoring purposes, a salinity gage should be established on the flood side of the HNC.

NMFS41

Section 4.3.9 Mitigation

To compensate for impacts to marsh, NMFS prefers marsh creation (i.e., fill placement in open water) on the flood side of the proposed levee. The map details in Appendix G are generic concepts. The design, location, and amount of mitigation have not been coordinated with the interagency HET and are in need of substantial revision both for programmatic and constructible features, as well as to offset direct and indirect impacts. Marsh creation in open water should be the primary focus and filling existing marsh should be avoided. Also, the layout of the mitigation should be revised to avoid altering hydrology and impeding flow from environmental water control structures under Falgout Canal Road in Reach E-1. A thorough analysis of direct and indirect impacts of the constructible features should be completed and this section of the Final RPEIS should be revised by including corrected plats identifying the specific limits for the mitigation work. Construction access corridors, staging areas, and borrow areas to supplement any shortfalls from sidecast disposal of organic overburden should be identified and discussed. Any dedicated dredging borrow sites to create marsh should be sited and designed to avoid inducing erosion (e.g., wave or slope-failure) of existing marsh bank lines. If borrow is expected from bayous, the borrow sites should be segmented with undredged reaches to serve as under water plugs to minimize saltwater intrusion. The borrow areas should be designed to minimize adverse impacts to water quality to the extent practicable. The implications of borrow sites on water quality should be discussed. The USACE is encouraged to include dissolved oxygen

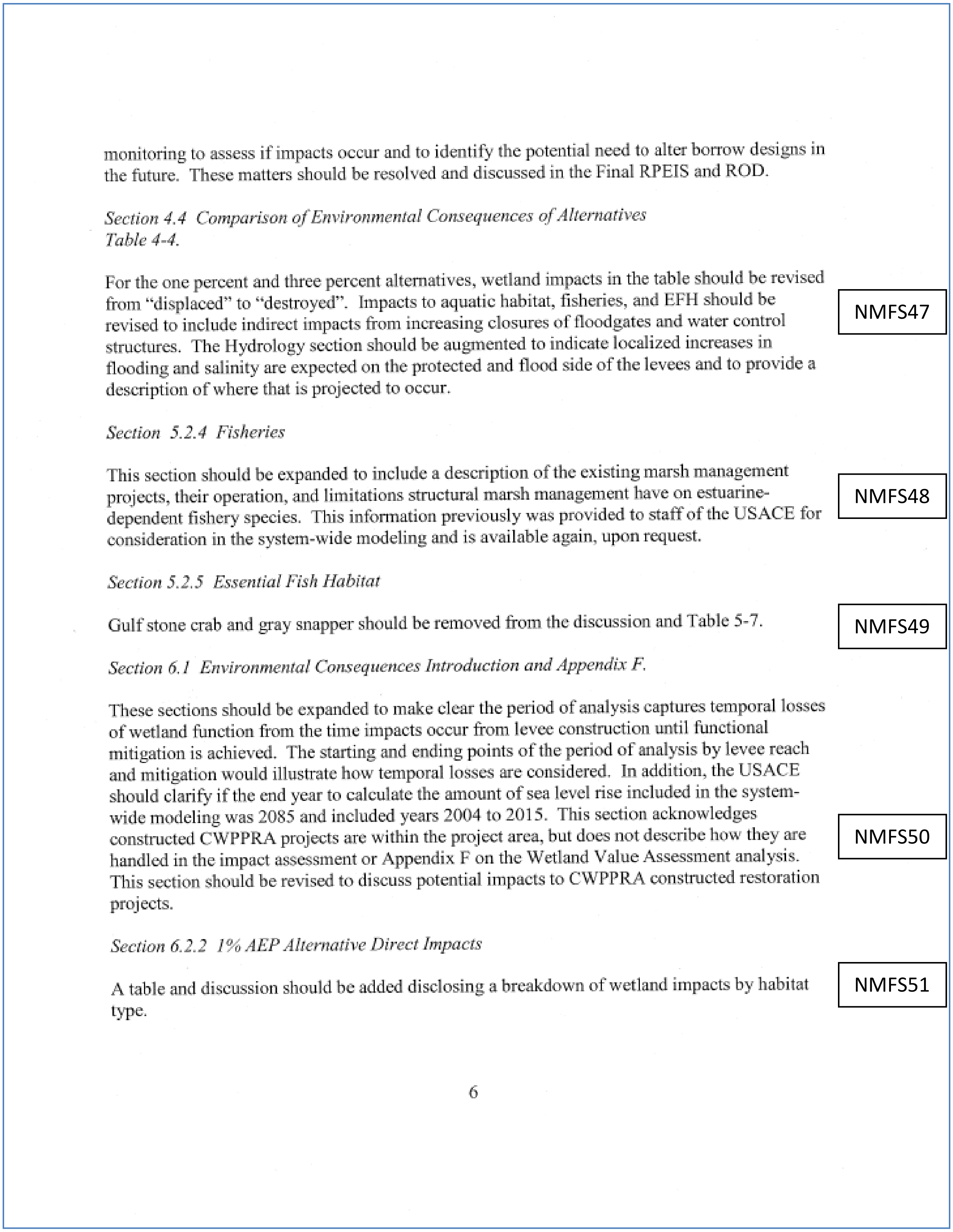
NMFS42

NMFS43

NMFS44

NMFS45

NMFS46



monitoring to assess if impacts occur and to identify the potential need to alter borrow designs in the future. These matters should be resolved and discussed in the Final RPEIS and ROD.

Section 4.4 Comparison of Environmental Consequences of Alternatives
Table 4-4.

For the one percent and three percent alternatives, wetland impacts in the table should be revised from "displaced" to "destroyed". Impacts to aquatic habitat, fisheries, and EFH should be revised to include indirect impacts from increasing closures of floodgates and water control structures. The Hydrology section should be augmented to indicate localized increases in flooding and salinity are expected on the protected and flood side of the levees and to provide a description of where that is projected to occur.

NMFS47

Section 5.2.4 Fisheries

This section should be expanded to include a description of the existing marsh management projects, their operation, and limitations structural marsh management have on estuarine-dependent fishery species. This information previously was provided to staff of the USACE for consideration in the system-wide modeling and is available again, upon request.

NMFS48

Section 5.2.5 Essential Fish Habitat

Gulf stone crab and gray snapper should be removed from the discussion and Table 5-7.

NMFS49

Section 6.1 Environmental Consequences Introduction and Appendix F.

These sections should be expanded to make clear the period of analysis captures temporal losses of wetland function from the time impacts occur from levee construction until functional mitigation is achieved. The starting and ending points of the period of analysis by levee reach and mitigation would illustrate how temporal losses are considered. In addition, the USACE should clarify if the end year to calculate the amount of sea level rise included in the system-wide modeling was 2085 and included years 2004 to 2015. This section acknowledges constructed CWPPRA projects are within the project area, but does not describe how they are handled in the impact assessment or Appendix F on the Wetland Value Assessment analysis. This section should be revised to discuss potential impacts to CWPPRA constructed restoration projects.

NMFS50

Section 6.2.2 1% AEP Alternative Direct Impacts

A table and discussion should be added disclosing a breakdown of wetland impacts by habitat type.

NMFS51

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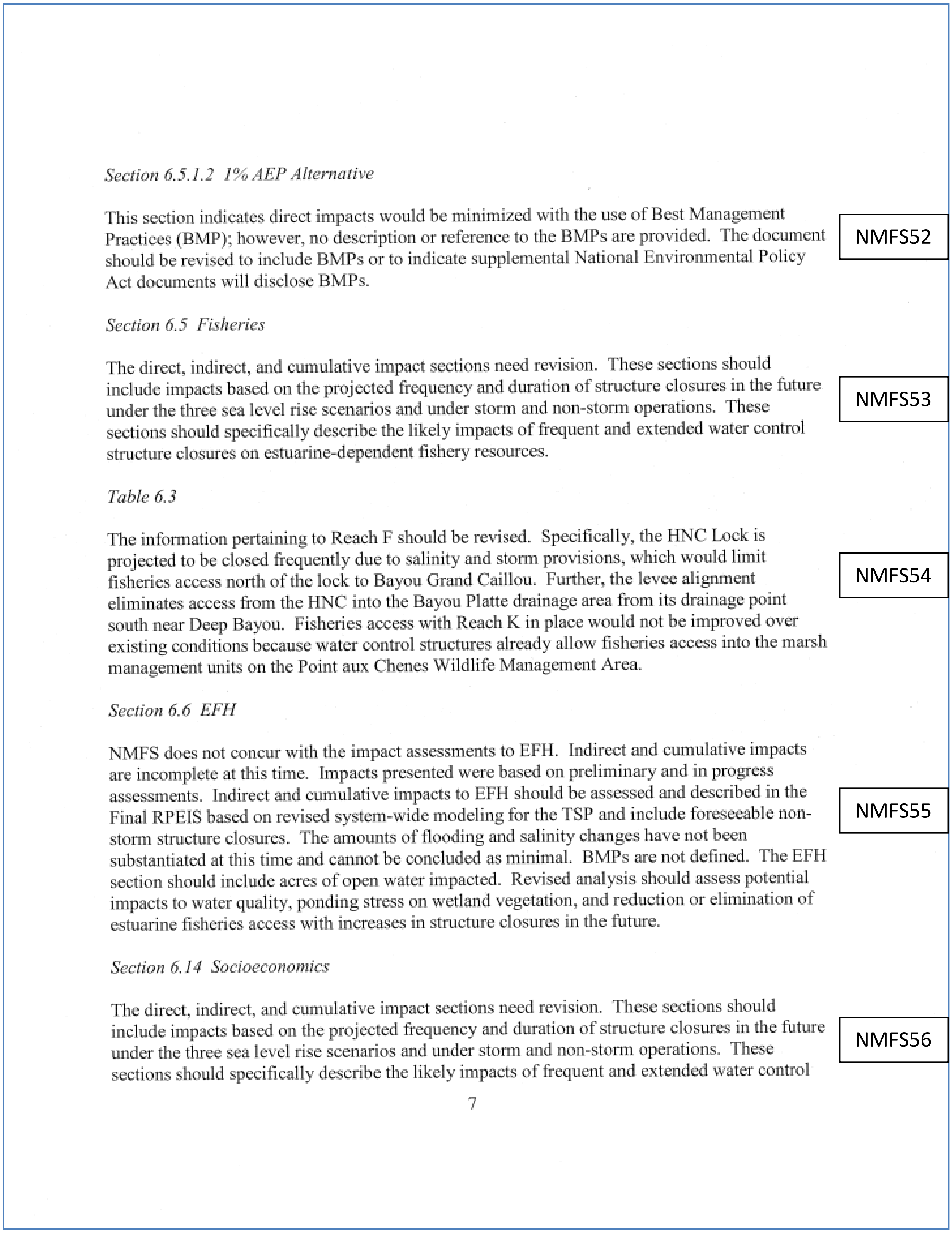


Section 6.5.1.2 1% AEP Alternative

This section indicates direct impacts would be minimized with the use of Best Management Practices (BMP); however, no description or reference to the BMPs are provided. The document should be revised to include BMPs or to indicate supplemental National Environmental Policy Act documents will disclose BMPs.

NMFS52

Section 6.5 Fisheries

The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control structure closures on estuarine-dependent fishery resources.

NMFS53

Table 6.3

The information pertaining to Reach F should be revised. Specifically, the HNC Lock is projected to be closed frequently due to salinity and storm provisions, which would limit fisheries access north of the lock to Bayou Grand Caillou. Further, the levee alignment eliminates access from the HNC into the Bayou Platte drainage area from its drainage point south near Deep Bayou. Fisheries access with Reach K in place would not be improved over existing conditions because water control structures already allow fisheries access into the marsh management units on the Point aux Chenes Wildlife Management Area.

NMFS54

Section 6.6 EFH

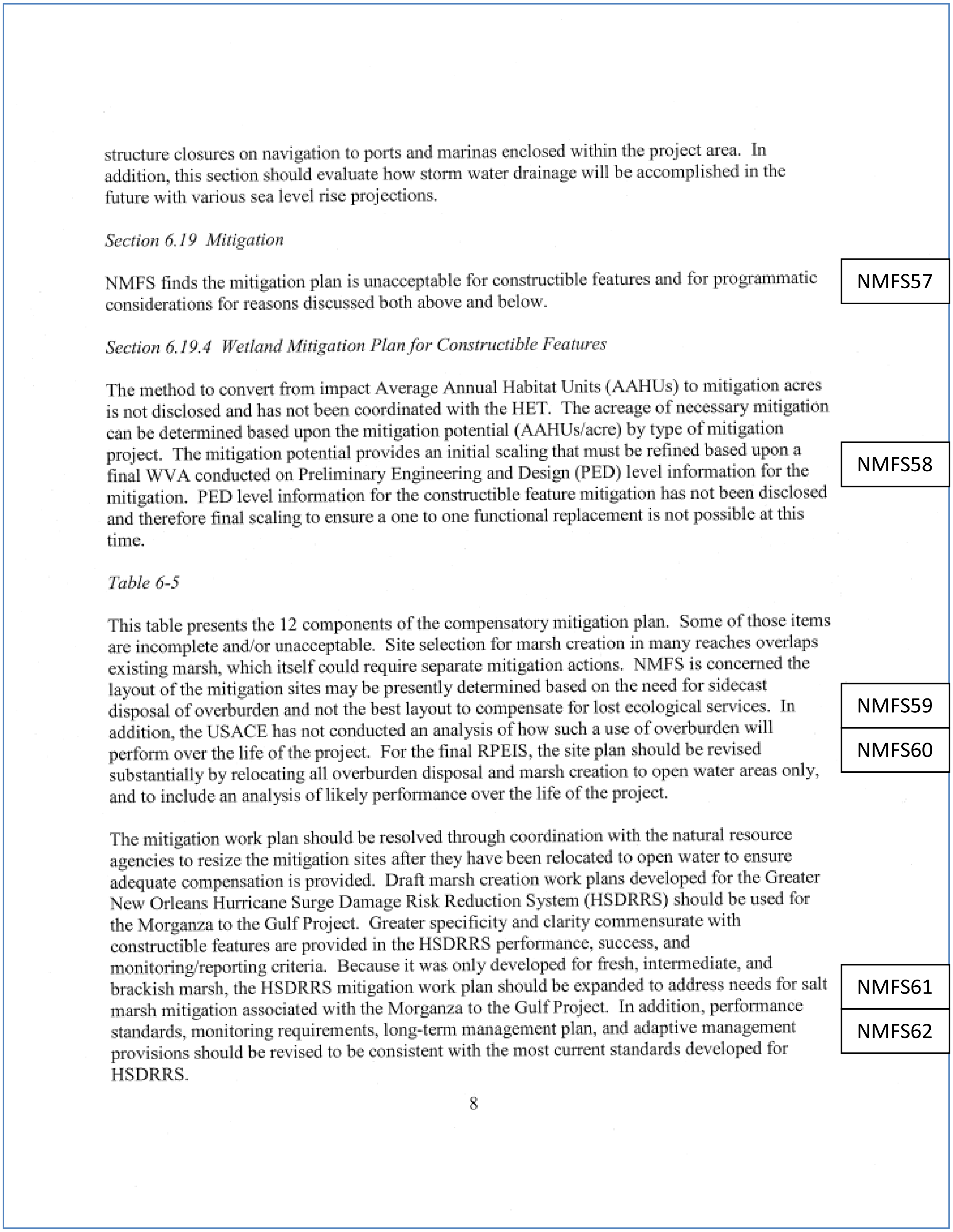
NMFS does not concur with the impact assessments to EFH. Indirect and cumulative impacts are incomplete at this time. Impacts presented were based on preliminary and in progress assessments. Indirect and cumulative impacts to EFH should be assessed and described in the Final RPEIS based on revised system-wide modeling for the TSP and include foreseeable non-storm structure closures. The amounts of flooding and salinity changes have not been substantiated at this time and cannot be concluded as minimal. BMPs are not defined. The EFH section should include acres of open water impacted. Revised analysis should assess potential impacts to water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine fisheries access with increases in structure closures in the future.

NMFS55

Section 6.14 Socioeconomics

The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control

NMFS56



structure closures on navigation to ports and marinas enclosed within the project area. In addition, this section should evaluate how storm water drainage will be accomplished in the future with various sea level rise projections.

Section 6.19 Mitigation

NMFS finds the mitigation plan is unacceptable for constructible features and for programmatic considerations for reasons discussed both above and below.

NMFS57

Section 6.19.4 Wetland Mitigation Plan for Constructible Features

The method to convert from impact Average Annual Habitat Units (AAHUs) to mitigation acres is not disclosed and has not been coordinated with the HET. The acreage of necessary mitigation can be determined based upon the mitigation potential (AAHUs/acre) by type of mitigation project. The mitigation potential provides an initial scaling that must be refined based upon a final WVA conducted on Preliminary Engineering and Design (PED) level information for the mitigation. PED level information for the constructible feature mitigation has not been disclosed and therefore final scaling to ensure a one to one functional replacement is not possible at this time.

NMFS58

Table 6-5

This table presents the 12 components of the compensatory mitigation plan. Some of those items are incomplete and/or unacceptable. Site selection for marsh creation in many reaches overlaps existing marsh, which itself could require separate mitigation actions. NMFS is concerned the layout of the mitigation sites may be presently determined based on the need for sidecast disposal of overburden and not the best layout to compensate for lost ecological services. In addition, the USACE has not conducted an analysis of how such a use of overburden will perform over the life of the project. For the final RPEIS, the site plan should be revised substantially by relocating all overburden disposal and marsh creation to open water areas only, and to include an analysis of likely performance over the life of the project.

NMFS59

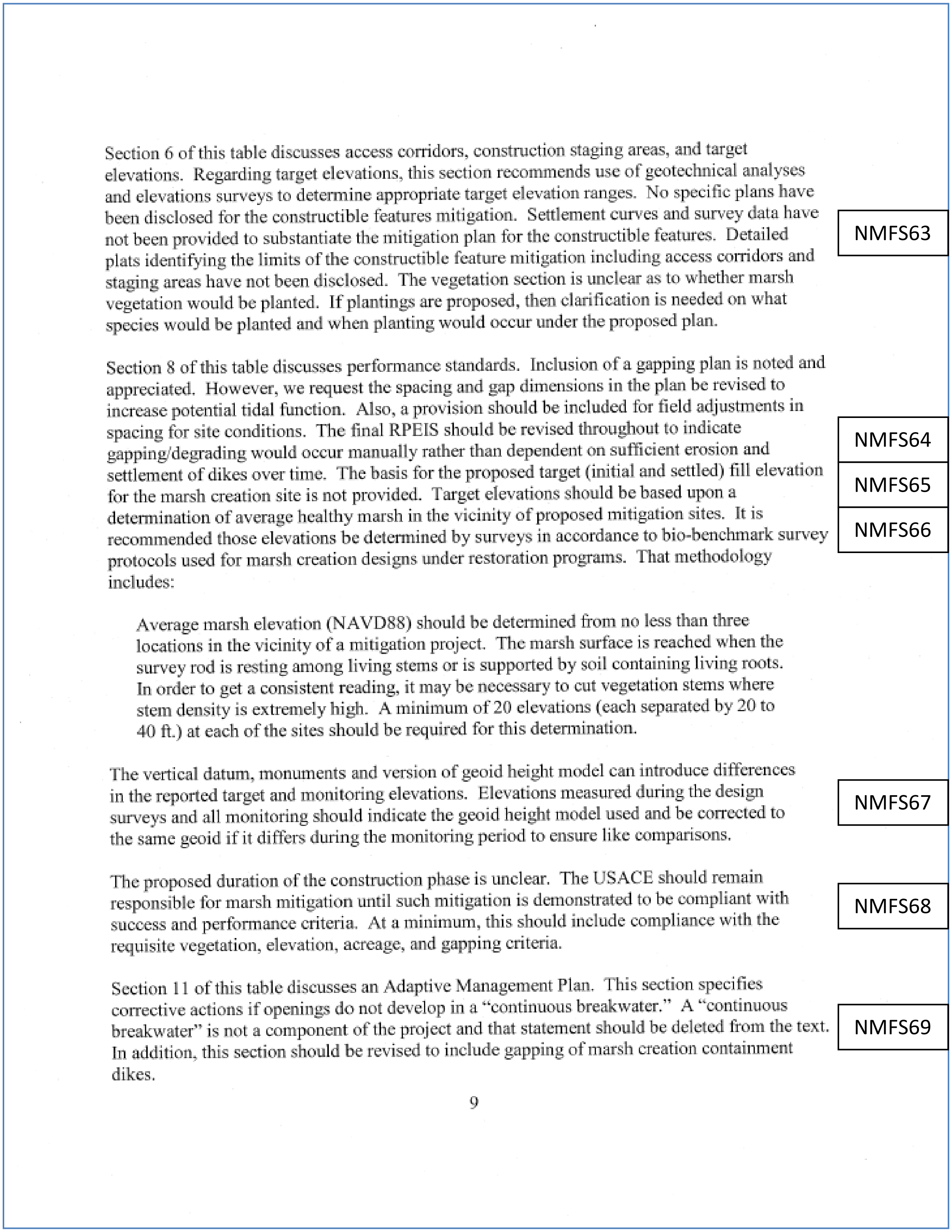
NMFS60

The mitigation work plan should be resolved through coordination with the natural resource agencies to resize the mitigation sites after they have been relocated to open water to ensure adequate compensation is provided. Draft marsh creation work plans developed for the Greater New Orleans Hurricane Surge Damage Risk Reduction System (HSDRRS) should be used for the Morganza to the Gulf Project. Greater specificity and clarity commensurate with constructible features are provided in the HSDRRS performance, success, and monitoring/reporting criteria. Because it was only developed for fresh, intermediate, and brackish marsh, the HSDRRS mitigation work plan should be expanded to address needs for salt marsh mitigation associated with the Morganza to the Gulf Project. In addition, performance standards, monitoring requirements, long-term management plan, and adaptive management provisions should be revised to be consistent with the most current standards developed for HSDRRS.

NMFS61

NMFS62

6



Section 6 of this table discusses access corridors, construction staging areas, and target elevations. Regarding target elevations, this section recommends use of geotechnical analyses and elevations surveys to determine appropriate target elevation ranges. No specific plans have been disclosed for the constructible features mitigation. Settlement curves and survey data have not been provided to substantiate the mitigation plan for the constructible features. Detailed plats identifying the limits of the constructible feature mitigation including access corridors and staging areas have not been disclosed. The vegetation section is unclear as to whether marsh vegetation would be planted. If plantings are proposed, then clarification is needed on what species would be planted and when planting would occur under the proposed plan.

NMFS63

Section 8 of this table discusses performance standards. Inclusion of a gapping plan is noted and appreciated. However, we request the spacing and gap dimensions in the plan be revised to increase potential tidal function. Also, a provision should be included for field adjustments in spacing for site conditions. The final RPEIS should be revised throughout to indicate gapping/degrading would occur manually rather than dependent on sufficient erosion and settlement of dikes over time. The basis for the proposed target (initial and settled) fill elevation for the marsh creation site is not provided. Target elevations should be based upon a determination of average healthy marsh in the vicinity of proposed mitigation sites. It is recommended those elevations be determined by surveys in accordance to bio-benchmark survey protocols used for marsh creation designs under restoration programs. That methodology includes:

NMFS64

NMFS65

NMFS66

> Average marsh elevation (NAVD88) should be determined from no less than three locations in the vicinity of a mitigation project. The marsh surface is reached when the survey rod is resting among living stems or is supported by soil containing living roots. In order to get a consistent reading, it may be necessary to cut vegetation stems where stem density is extremely high. A minimum of 20 elevations (each separated by 20 to 40 ft.) at each of the sites should be required for this determination.

The vertical datum, monuments and version of geoid height model can introduce differences in the reported target and monitoring elevations. Elevations measured during the design surveys and all monitoring should indicate the geoid height model used and be corrected to the same geoid if it differs during the monitoring period to ensure like comparisons.

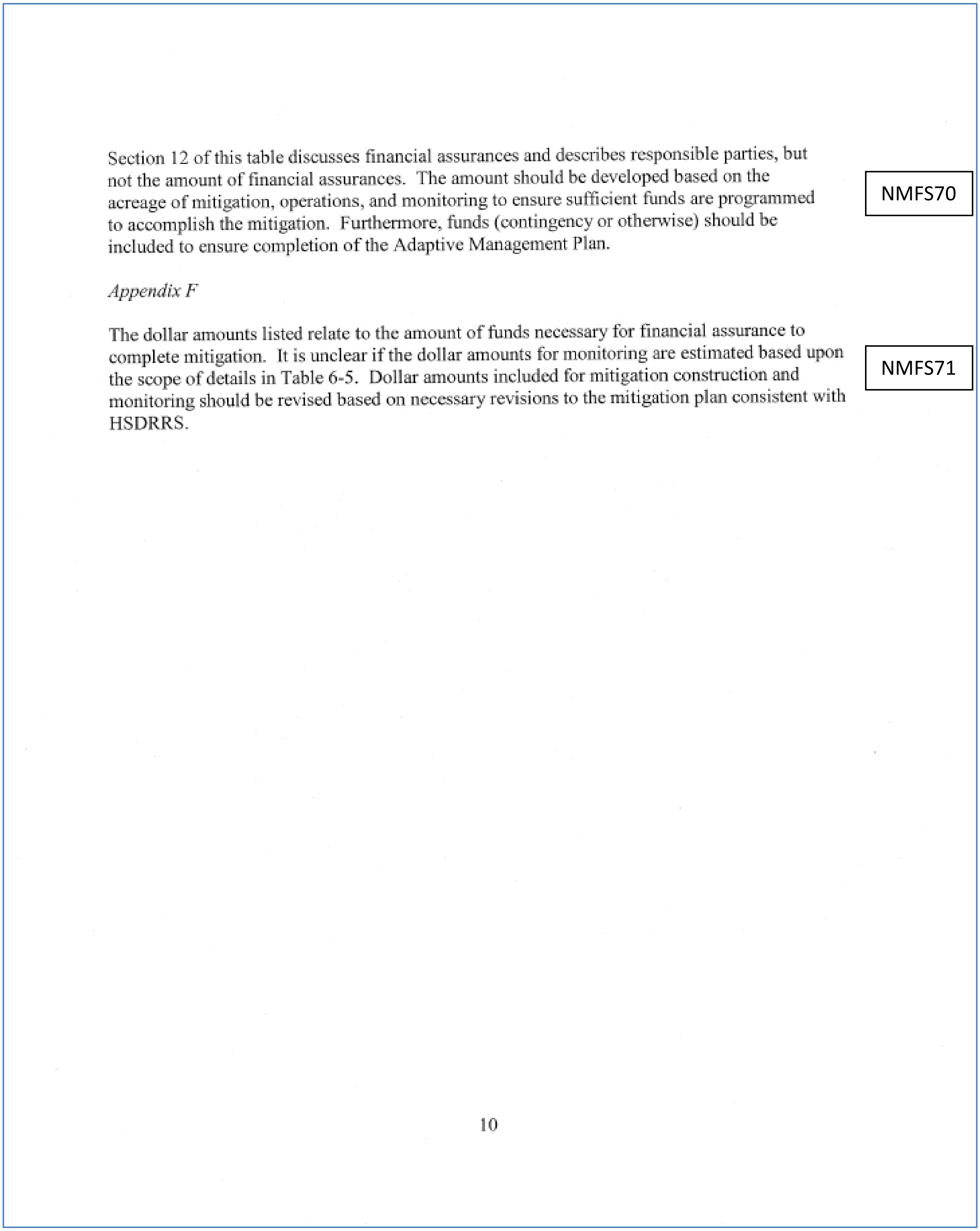
NMFS67

The proposed duration of the construction phase is unclear. The USACE should remain responsible for marsh mitigation until such mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria.

NMFS68

Section 11 of this table discusses an Adaptive Management Plan. This section specifies corrective actions if openings do not develop in a "continuous breakwater." A "continuous breakwater" is not a component of the project and that statement should be deleted from the text. In addition, this section should be revised to include gapping of marsh creation containment dikes.

NMFS69



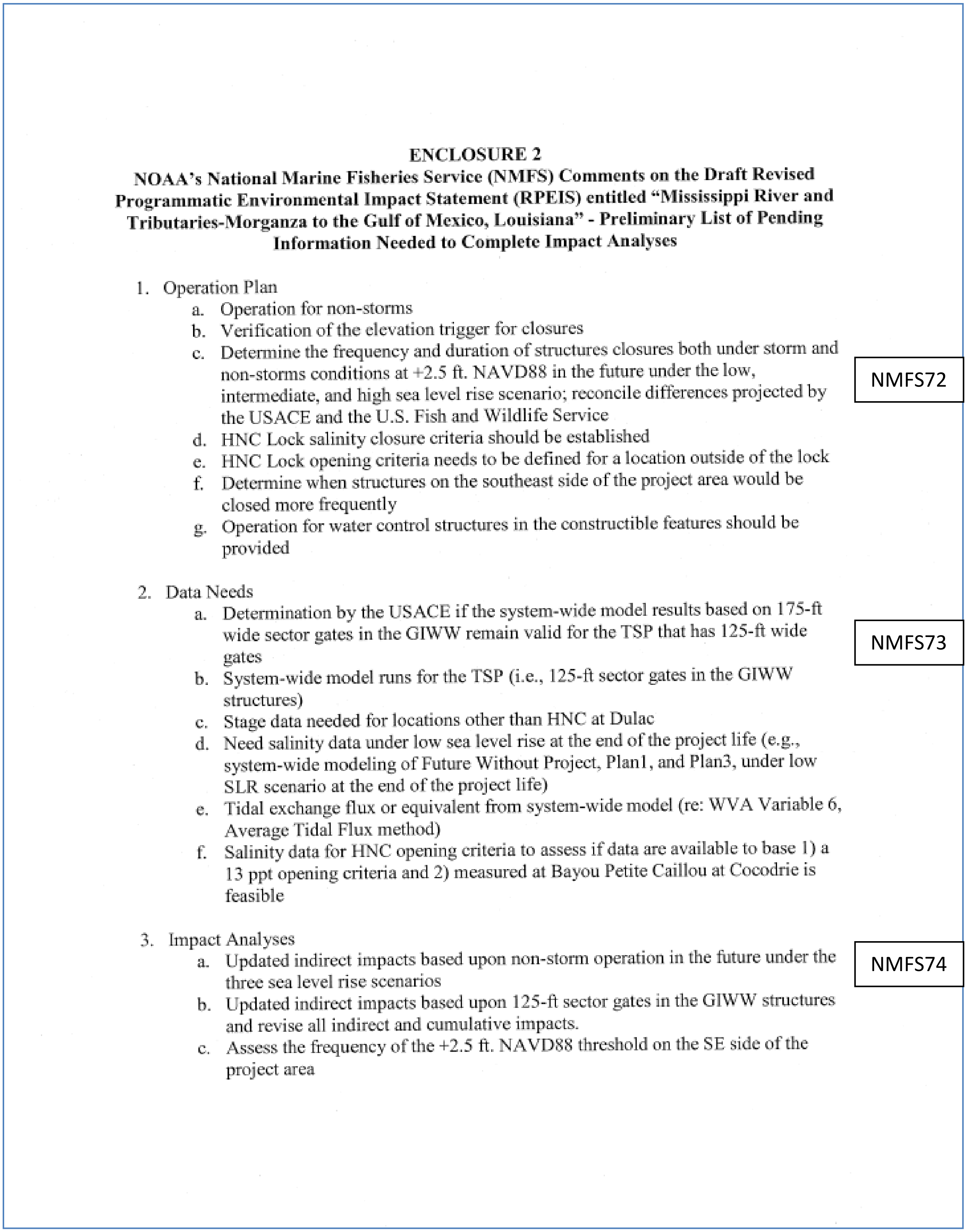
Section 12 of this table discusses financial assurances and describes responsible parties, but not the amount of financial assurances. The amount should be developed based on the acreage of mitigation, operations, and monitoring to ensure sufficient funds are programmed to accomplish the mitigation. Furthermore, funds (contingency or otherwise) should be included to ensure completion of the Adaptive Management Plan.

NMFS70

Appendix F

The dollar amounts listed relate to the amount of funds necessary for financial assurance to complete mitigation. It is unclear if the dollar amounts for monitoring are estimated based upon the scope of details in Table 6-5. Dollar amounts included for mitigation construction and monitoring should be revised based on necessary revisions to the mitigation plan consistent with HSDRRS.

NMFS71



ENCLOSURE 2

NOAA's National Marine Fisheries Service (NMFS) Comments on the Draft Revised Programmatic Environmental Impact Statement (RPEIS) entitled "Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana" - Preliminary List of Pending Information Needed to Complete Impact Analyses

1. Operation Plan
    a. Operation for non-storms
    b. Verification of the elevation trigger for closures
    c. Determine the frequency and duration of structures closures both under storm and non-storms conditions at +2.5 ft. NAVD88 in the future under the low, intermediate, and high sea level rise scenario; reconcile differences projected by the USACE and the U.S. Fish and Wildlife Service
    d. HNC Lock salinity closure criteria should be established
    e. HNC Lock opening criteria needs to be defined for a location outside of the lock
    f. Determine when structures on the southeast side of the project area would be closed more frequently
    g. Operation for water control structures in the constructible features should be provided

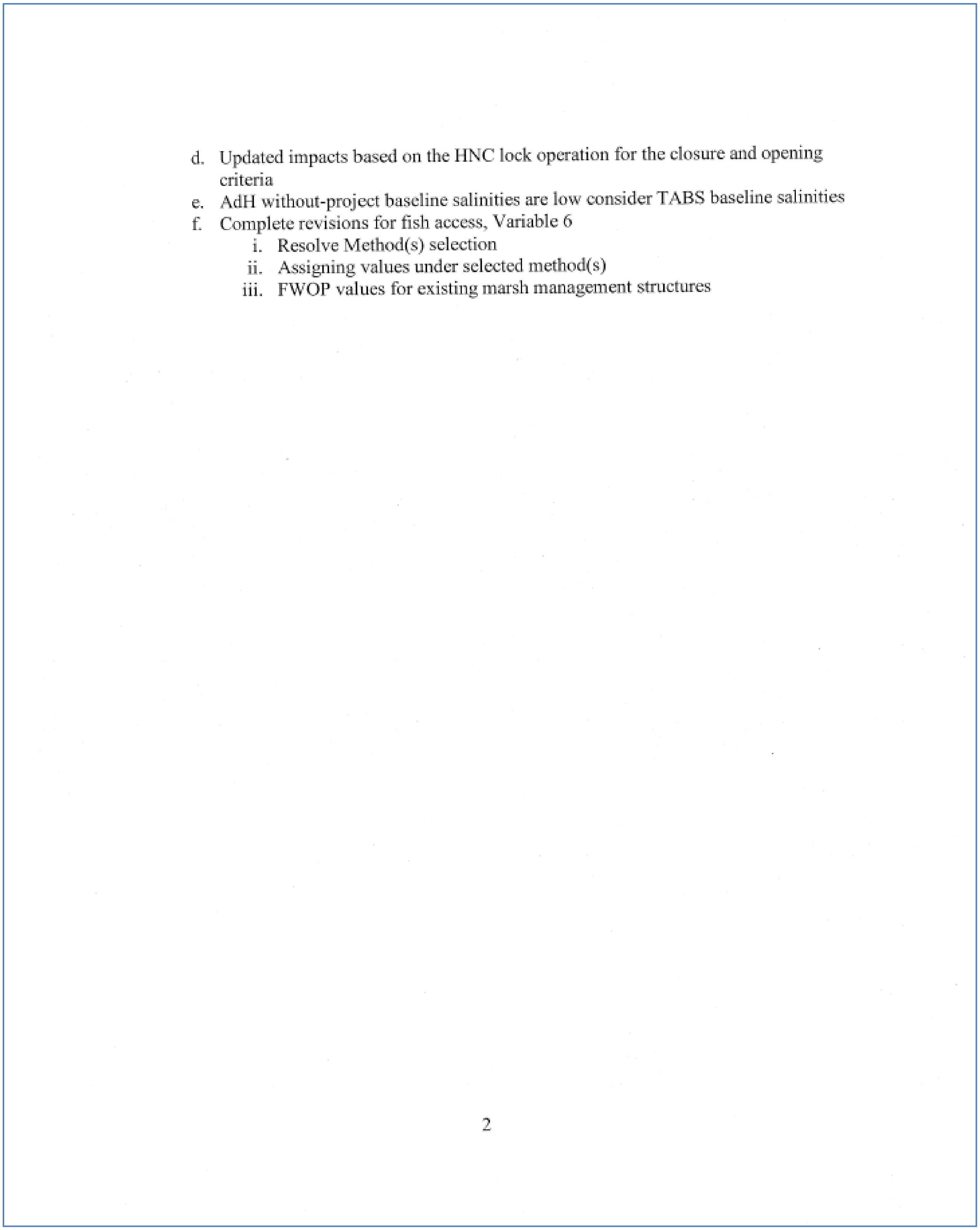
NMFS72

2. Data Needs
    a. Determination by the USACE if the system-wide model results based on 175-ft wide sector gates in the GIWW remain valid for the TSP that has 125-ft wide gates
    b. System-wide model runs for the TSP (i.e., 125-ft sector gates in the GIWW structures)
    c. Stage data needed for locations other than HNC at Dulac
    d. Need salinity data under low sea level rise at the end of the project life (e.g., system-wide modeling of Future Without Project, Plan1, and Plan3, under low SLR scenario at the end of the project life)
    e. Tidal exchange flux or equivalent from system-wide model (re: WVA Variable 6, Average Tidal Flux method)
    f. Salinity data for HNC opening criteria to assess if data are available to base 1) a 13 ppt opening criteria and 2) measured at Bayou Petite Caillou at Cocodrie is feasible

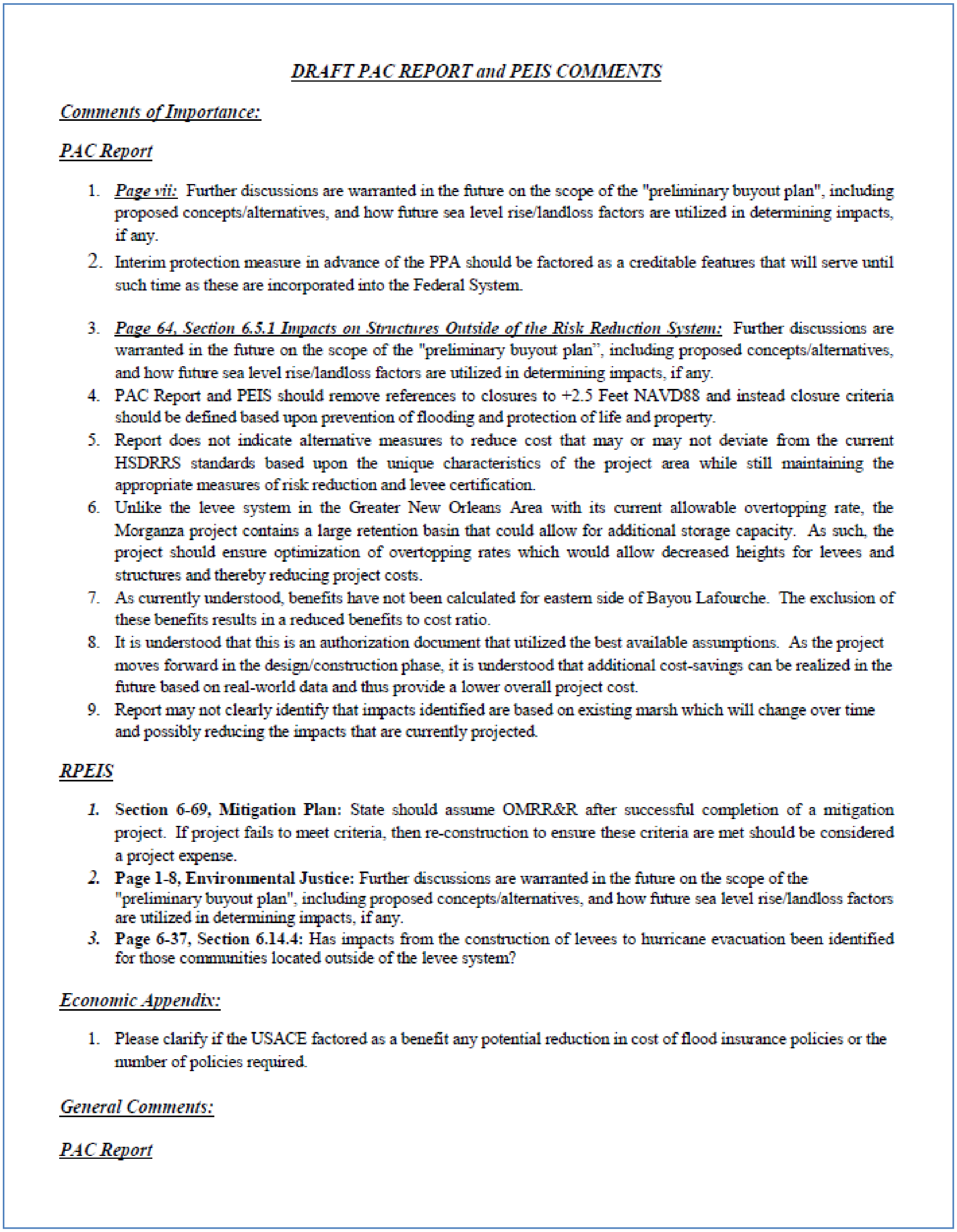
NMFS73

3. Impact Analyses
    a. Updated indirect impacts based upon non-storm operation in the future under the three sea level rise scenarios
    b. Updated indirect impacts based upon 125-ft sector gates in the GIWW structures and revise all indirect and cumulative impacts.
    c. Assess the frequency of the +2.5 ft. NAVD88 threshold on the SE side of the project area

NMFS74



d. Updated impacts based on the HNC lock operation for the closure and opening criteria
e. AdH without-project baseline salinities are low consider TABS baseline salinities
f. Complete revisions for fish access, Variable 6
    i. Resolve Method(s) selection
    ii. Assigning values under selected method(s)
    iii. FWOP values for existing marsh management structures



DRAFT PAC REPORT and PEIS COMMENTS

Comments of Importance:

PAC Report

1. *Page vii:* Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any. CPRA1
2. Interim protection measure in advance of the PPA should be factored as a creditable features that will serve until such time as these are incorporated into the Federal System. CPRA2
3. *Page 64, Section 6.5.1 Impacts on Structures Outside of the Risk Reduction System:* Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any. CPRA3
4. PAC Report and PEIS should remove references to closures to +2.5 Feet NAVD88 and instead closure criteria should be defined based upon prevention of flooding and protection of life and property. CPRA4
5. Report does not indicate alternative measures to reduce cost that may or may not deviate from the current HSDRRS standards based upon the unique characteristics of the project area while still maintaining the appropriate measures of risk reduction and levee certification. CPRA5
6. Unlike the levee system in the Greater New Orleans Area with its current allowable overtopping rate, the Morganza project contains a large retention basin that could allow for additional storage capacity. As such, the project should ensure optimization of overtopping rates which would allow decreased heights for levees and structures and thereby reducing project costs. CPRA6
7. As currently understood, benefits have not been calculated for eastern side of Bayou Lafourche. The exclusion of these benefits results in a reduced benefits to cost ratio. CPRA7
8. It is understood that this is an authorization document that utilized the best available assumptions. As the project moves forward in the design/construction phase, it is understood that additional cost-savings can be realized in the future based on real-world data and thus provide a lower overall project cost. CPRA8
9. Report may not clearly identify that impacts identified are based on existing marsh which will change over time and possibly reducing the impacts that are currently projected. CPRA9

RPEIS

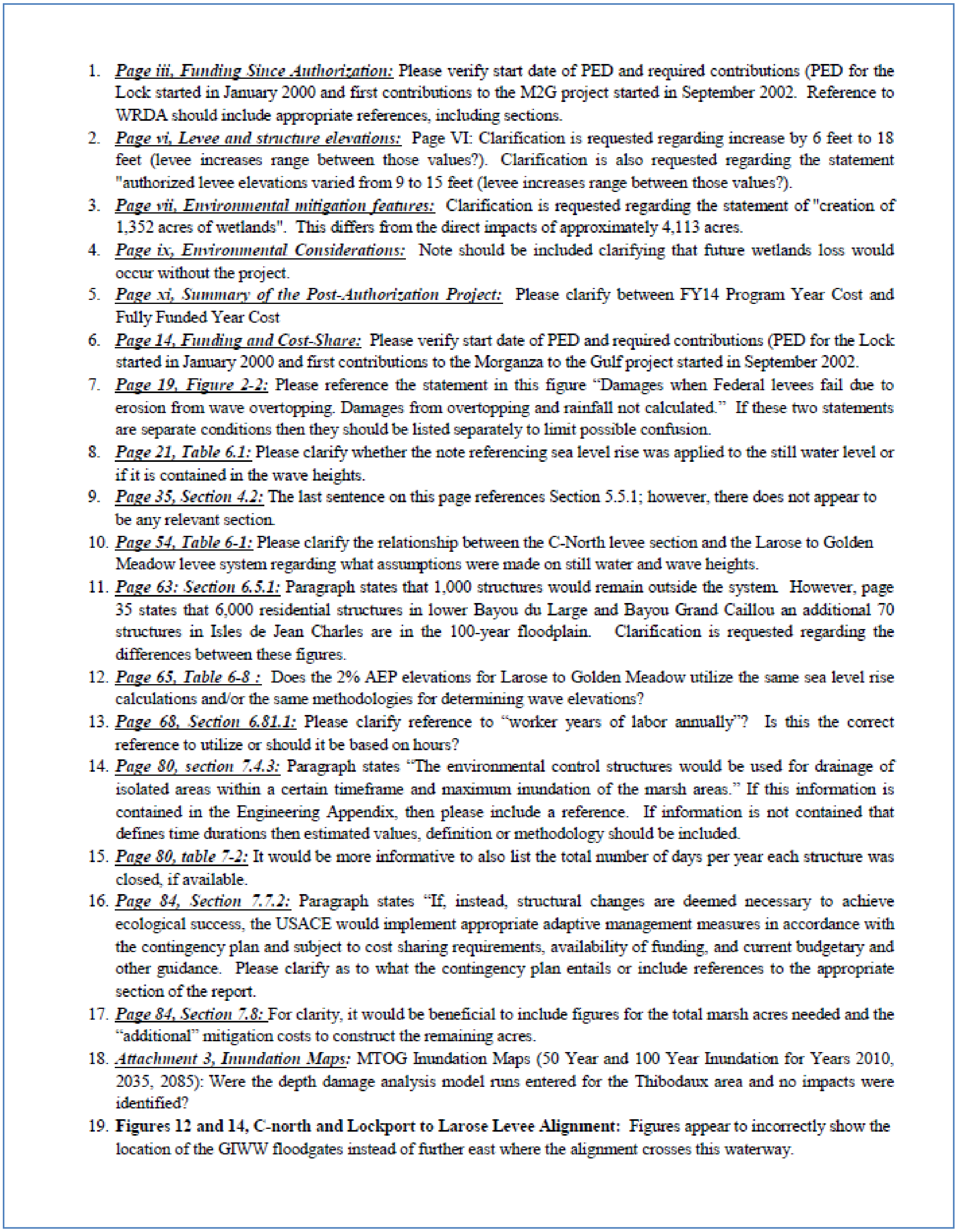
1. **Section 6-69, Mitigation Plan:** State should assume OMRR&R after successful completion of a mitigation project. If project fails to meet criteria, then re-construction to ensure these criteria are met should be considered a project expense. CPRA10
2. **Page 1-8, Environmental Justice:** Further discussions are warranted in the future on the scope of the "preliminary buyout plan", including proposed concepts/alternatives, and how future sea level rise/landloss factors are utilized in determining impacts, if any. CPRA11
3. **Page 6-37, Section 6.14.4:** Has impacts from the construction of levees to hurricane evacuation been identified for those communities located outside of the levee system? CPRA12

Economic Appendix:

1. Please clarify if the USACE factored as a benefit any potential reduction in cost of flood insurance policies or the number of policies required. CPRA13

General Comments:

PAC Report



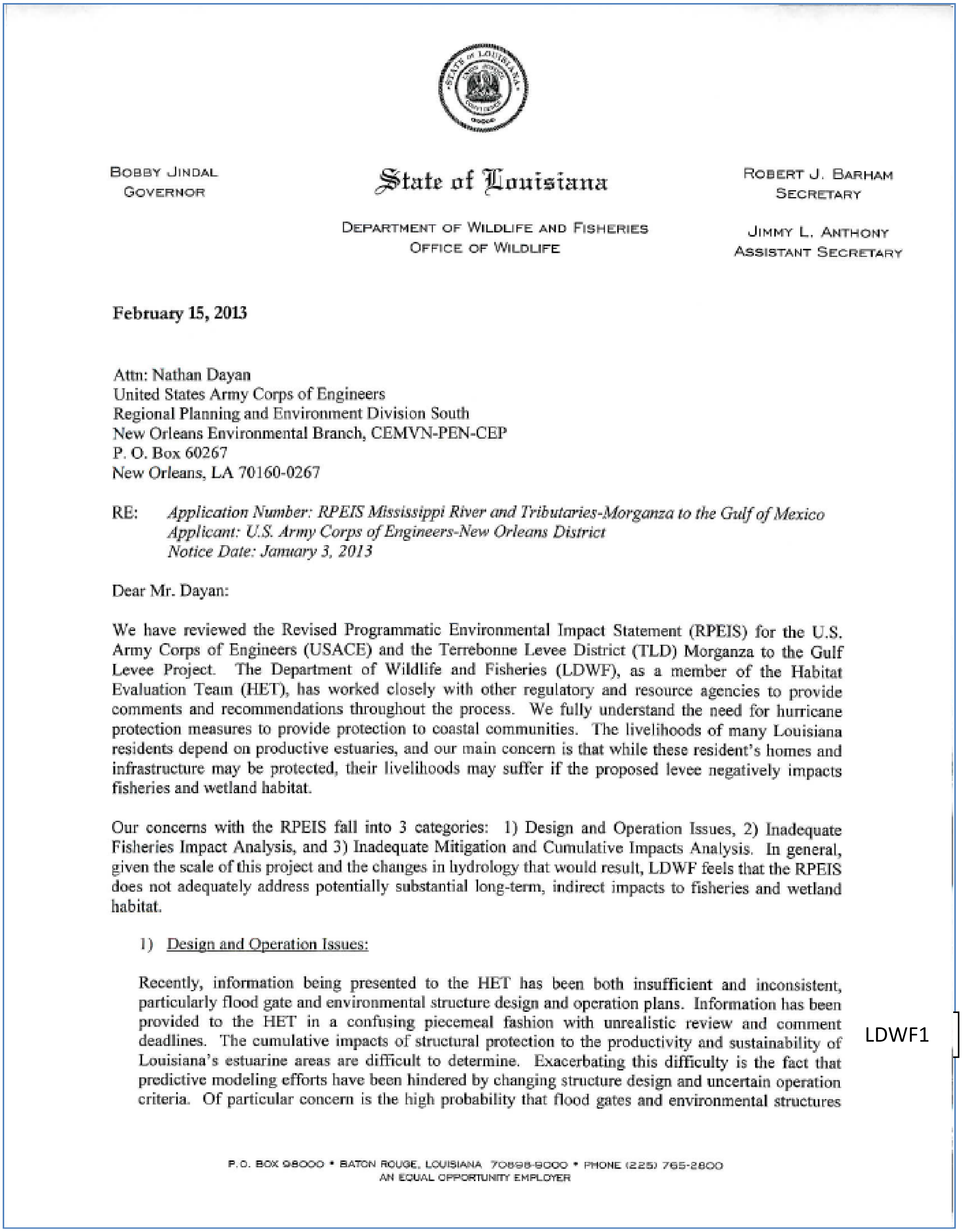
1. *Page iii, Funding Since Authorization:* Please verify start date of PED and required contributions (PED for the Lock started in January 2000 and first contributions to the M2G project started in September 2002. Reference to WRDA should include appropriate references, including sections. CPRA14
2. *Page vi, Levee and structure elevations:* Page VI: Clarification is requested regarding increase by 6 feet to 18 feet (levee increases range between those values?). Clarification is also requested regarding the statement "authorized levee elevations varied from 9 to 15 feet (levee increases range between those values?). CPRA15
3. *Page vii, Environmental mitigation features:* Clarification is requested regarding the statement of "creation of 1,352 acres of wetlands". This differs from the direct impacts of approximately 4,113 acres. CPRA16
4. *Page ix, Environmental Considerations:* Note should be included clarifying that future wetlands loss would occur without the project. CPRA17
5. *Page xi, Summary of the Post-Authorization Project:* Please clarify between FY14 Program Year Cost and Fully Funded Year Cost CPRA18
6. *Page 14, Funding and Cost-Share:* Please verify start date of PED and required contributions (PED for the Lock started in January 2000 and first contributions to the Morganza to the Gulf project started in September 2002. CPRA19
7. *Page 19, Figure 2-2:* Please reference the statement in this figure "Damages when Federal levees fail due to erosion from wave overtopping. Damages from overtopping and rainfall not calculated." If these two statements are separate conditions then they should be listed separately to limit possible confusion. CPRA20
8. *Page 21, Table 6.1:* Please clarify whether the note referencing sea level rise was applied to the still water level or if it is contained in the wave heights. CPRA21
9. *Page 35, Section 4.2:* The last sentence on this page references Section 5.5.1; however, there does not appear to be any relevant section. CPRA22
10. *Page 54, Table 6-1:* Please clarify the relationship between the C-North levee section and the Larose to Golden Meadow levee system regarding what assumptions were made on still water and wave heights. CPRA23
11. *Page 63: Section 6.5.1:* Paragraph states that 1,000 structures would remain outside the system. However, page 35 states that 6,000 residential structures in lower Bayou du Large and Bayou Grand Caillou an additional 70 structures in Isles de Jean Charles are in the 100-year floodplain. Clarification is requested regarding the differences between these figures. CPRA24
12. *Page 65, Table 6-8 :* Does the 2% AEP elevations for Larose to Golden Meadow utilize the same sea level rise calculations and/or the same methodologies for determining wave elevations? CPRA25
13. *Page 68, Section 6.81.1:* Please clarify reference to "worker years of labor annually"? Is this the correct reference to utilize or should it be based on hours? CPRA26
14. *Page 80, section 7.4.3:* Paragraph states "The environmental control structures would be used for drainage of isolated areas within a certain timeframe and maximum inundation of the marsh areas." If this information is contained in the Engineering Appendix, then please include a reference. If information is not contained that defines time durations then estimated values, definition or methodology should be included. CPRA27
15. *Page 80, table 7-2:* It would be more informative to also list the total number of days per year each structure was closed, if available. CPRA28
16. *Page 84, Section 7.7.2:* Paragraph states "If, instead, structural changes are deemed necessary to achieve ecological success, the USACE would implement appropriate adaptive management measures in accordance with the contingency plan and subject to cost sharing requirements, availability of funding, and current budgetary and other guidance. Please clarify as to what the contingency plan entails or include references to the appropriate section of the report. CPRA29
17. *Page 84, Section 7.8:* For clarity, it would be beneficial to include figures for the total marsh acres needed and the "additional" mitigation costs to construct the remaining acres. CPRA30
18. *Attachment 3, Inundation Maps:* MTOG Inundation Maps (50 Year and 100 Year Inundation for Years 2010, 2035, 2085): Were the depth damage analysis model runs entered for the Thibodaux area and no impacts were identified? CPRA31
19. **Figures 12 and 14, C-north and Lockport to Larose Levee Alignment:** Figures appear to incorrectly show the location of the GIWW floodgates instead of further east where the alignment crosses this waterway. CPRA32

RPEIS

1. **Page 1-8, Environmental Justice:** In reference to the statement "This study complies with the requirements of Executive Order 12989." The correct Executive Order is 12898. CPRA33
2. **Appendix A, Environmental Supporting Information:** Information does not appear to include current information pertaining to recent changes to Endangered and Threatened Species Act. Please clarify if there are any new study data in the project area that would warrant inclusion. CPRA34
3. **Appendix A, Environmental Supporting Information:** Please clarify why this document lists species that are not found in the project area (i.e. Finback Whales) and listing of locations that would appear to be outside of the project area (i.e. Raccoon Island). CPRA35
4. **Appendix C: Clean Water Act 404b, page 37, Section G - Determination of Cumulative Effects on the Aquatic Ecosystem**: Please clarify the whether the statement that the project would cause a decrease in water temperature and an increase in dissolved oxygen levels is correct. Please note that on page 16, it states that the project could cause a decrease in dissolved oxygen, which is the opposite of what is contained in Section G. CPRA36

Economic Appendix:

1. *Table 8, FEMA Flood Claims by Parish 1978-2011:* The table references number of claims paid; however, a claim amount was not included for each respective parish. Additionally, is it clearly noted that there are two separate sources for damage claims during flood events, those that would be claimed under the FEMA policy and those that fall outside of the FEMA flood policies. CPRA37



BOBBY JINDAL
GOVERNOR

State of Louisiana

DEPARTMENT OF WILDLIFE AND FISHERIES
OFFICE OF WILDLIFE

ROBERT J. BARHAM
SECRETARY

JIMMY L. ANTHONY
ASSISTANT SECRETARY

February 15, 2013

Attn: Nathan Dayan
United States Army Corps of Engineers
Regional Planning and Environment Division South
New Orleans Environmental Branch, CEMVN-PEN-CEP
P. O. Box 60267
New Orleans, LA 70160-0267

RE: *Application Number: RPEIS Mississippi River and Tributaries-Morganza to the Gulf of Mexico*
Applicant: U.S. Army Corps of Engineers-New Orleans District
Notice Date: January 3, 2013

Dear Mr. Dayan:

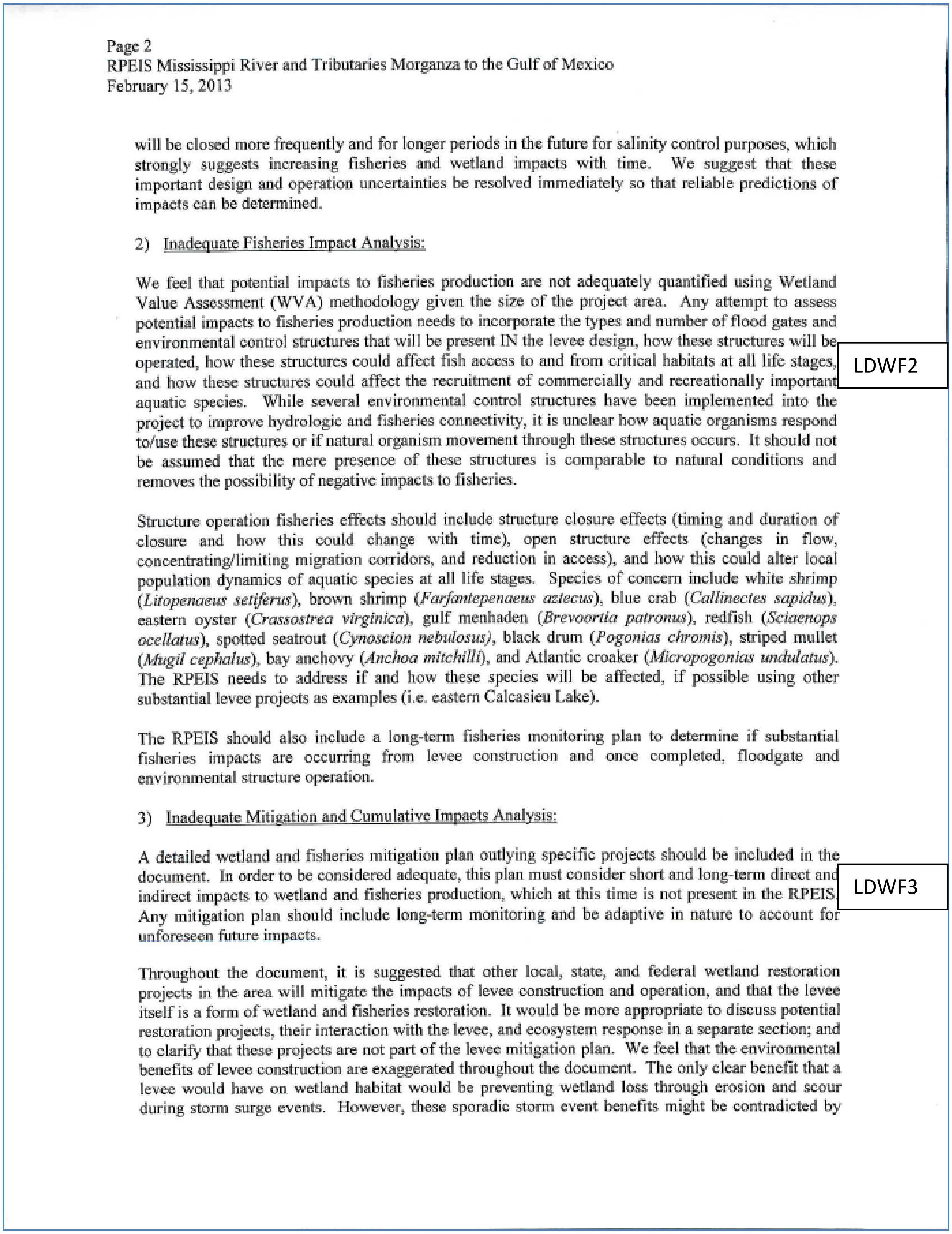
We have reviewed the Revised Programmatic Environmental Impact Statement (RPEIS) for the U.S. Army Corps of Engineers (USACE) and the Terrebonne Levee District (TLD) Morganza to the Gulf Levee Project. The Department of Wildlife and Fisheries (LDWF), as a member of the Habitat Evaluation Team (HET), has worked closely with other regulatory and resource agencies to provide comments and recommendations throughout the process. We fully understand the need for hurricane protection measures to provide protection to coastal communities. The livelihoods of many Louisiana residents depend on productive estuaries, and our main concern is that while these resident's homes and infrastructure may be protected, their livelihoods may suffer if the proposed levee negatively impacts fisheries and wetland habitat.

Our concerns with the RPEIS fall into 3 categories: 1) Design and Operation Issues, 2) Inadequate Fisheries Impact Analysis, and 3) Inadequate Mitigation and Cumulative Impacts Analysis. In general, given the scale of this project and the changes in hydrology that would result, LDWF feels that the RPEIS does not adequately address potentially substantial long-term, indirect impacts to fisheries and wetland habitat.

1) Design and Operation Issues:

Recently, information being presented to the HET has been both insufficient and inconsistent, particularly flood gate and environmental structure design and operation plans. Information has been provided to the HET in a confusing piecemeal fashion with unrealistic review and comment deadlines. The cumulative impacts of structural protection to the productivity and sustainability of Louisiana's estuarine areas are difficult to determine. Exacerbating this difficulty is the fact that predictive modeling efforts have been hindered by changing structure design and uncertain operation criteria. Of particular concern is the high probability that flood gates and environmental structures

LDWF1



will be closed more frequently and for longer periods in the future for salinity control purposes, which strongly suggests increasing fisheries and wetland impacts with time. We suggest that these important design and operation uncertainties be resolved immediately so that reliable predictions of impacts can be determined.

2) Inadequate Fisheries Impact Analysis:

We feel that potential impacts to fisheries production are not adequately quantified using Wetland Value Assessment (WVA) methodology given the size of the project area. Any attempt to assess potential impacts to 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 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 several environmental control structures have been implemented into the project 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. 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 fisheries.

LDWF2

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. Species of concern include white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*), blue crab (*Callinectes sapidus*), eastern oyster (*Crassostrea virginica*), gulf menhaden (*Brevoortia patronus*), redfish (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus)*, black drum (*Pogonias chromis*), striped mullet (*Mugil cephalus*), bay anchovy (*Anchoa mitchilli*), and Atlantic croaker (*Micropogonias undulatus*). The RPEIS needs to address if and how these species will be affected, if possible using other substantial levee projects as examples (i.e. eastern Calcasieu Lake).

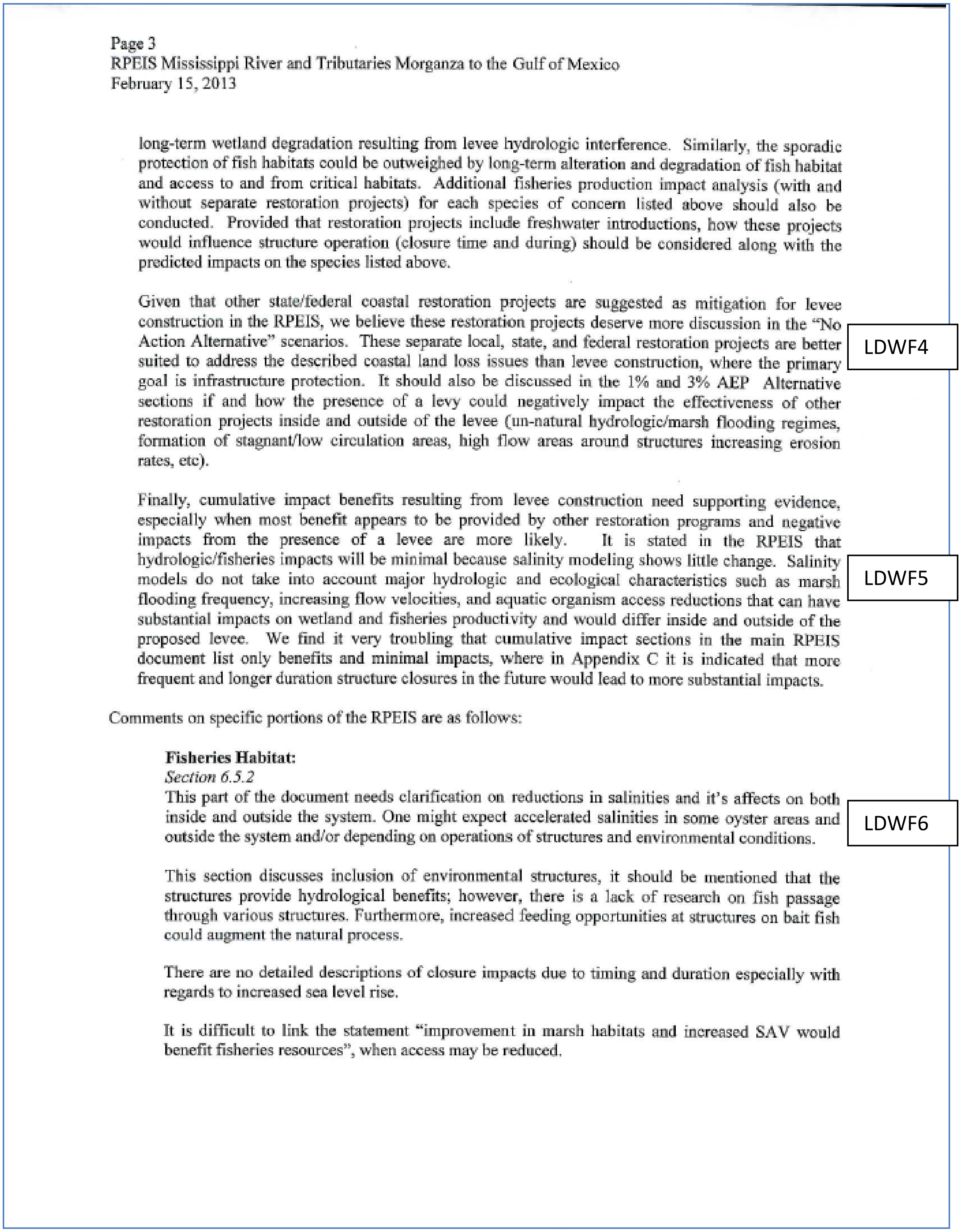
The RPEIS should also include a long-term fisheries monitoring plan to determine if substantial fisheries impacts are occurring from levee construction and once completed, floodgate and environmental structure operation.

3) Inadequate Mitigation and Cumulative Impacts Analysis:

A detailed wetland and fisheries mitigation plan outlying specific projects should be included in the document. In order to be considered adequate, this plan must consider short and long-term direct and indirect impacts to wetland and fisheries production, which at this time is not present in the RPEIS. Any mitigation plan should include long-term monitoring and be adaptive in nature to account for unforeseen future impacts.

LDWF3

Throughout the document, it is suggested that other local, state, and federal wetland restoration projects in the area will mitigate the impacts of levee construction and operation, and that the levee itself is a form of wetland and fisheries restoration. It would be more appropriate to discuss potential restoration projects, their interaction with the levee, and ecosystem response in a separate section; and to clarify that these projects are not part of the levee mitigation plan. We feel that the environmental benefits of levee construction are exaggerated throughout the document. The only clear benefit that a levee would have on wetland habitat would be preventing wetland loss 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. Similarly, the sporadic protection of fish habitats could be outweighed by long-term alteration and degradation of fish habitat and access to and from critical habitats. Additional fisheries production impact analysis (with and without separate restoration projects) for each species of concern listed above should also be conducted. Provided that restoration projects include freshwater introductions, how these projects would influence structure operation (closure time and during) should be considered along with the predicted impacts on the species listed above.

Given that other state/federal coastal restoration projects are suggested as mitigation for levee construction in the RPEIS, we believe these restoration projects deserve more discussion in the "No Action Alternative" scenarios. These separate local, state, and federal restoration projects are better suited to address the described coastal land loss issues than levee construction, where the primary goal is infrastructure protection. It should also be discussed in the 1% and 3% AEP Alternative sections if and how the presence of a levy could negatively impact the effectiveness of other 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).

LDWF4

Finally, cumulative impact benefits resulting from levee construction need supporting evidence, especially when most benefit appears to be provided by other restoration programs and negative impacts from the presence of a levee are more likely. It is stated in the RPEIS that hydrologic/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. We find it very troubling that cumulative impact sections in the main RPEIS document list only benefits and minimal impacts, where in Appendix C it is indicated that more frequent and longer duration structure closures in the future would lead to more substantial impacts.

LDWF5

Comments on specific portions of the RPEIS are as follows:

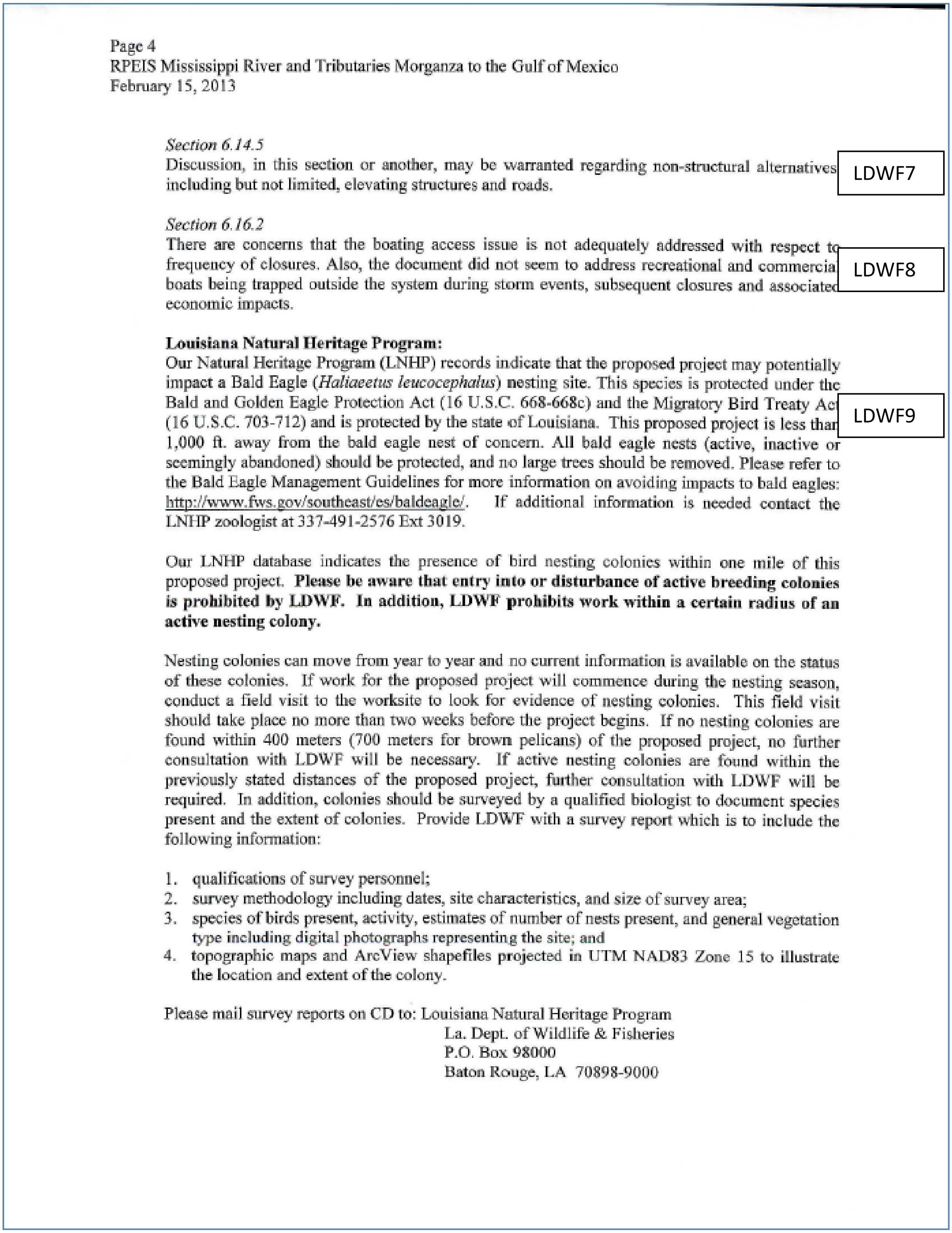
Fisheries Habitat:
Section 6.5.2
This part of the document needs clarification on reductions in salinities and it's affects on both inside and outside the system. One might expect accelerated salinities in some oyster areas and outside the system and/or depending on operations of structures and environmental conditions.

LDWF6

This section discusses inclusion of environmental structures, it should be mentioned that the structures provide hydrological benefits; however, there is a lack of research on fish passage through various structures. Furthermore, increased feeding opportunities at structures on bait fish could augment the natural process.

There are no detailed descriptions of closure impacts due to timing and duration especially with regards to increased sea level rise.

It is difficult to link the statement "improvement in marsh habitats and increased SAV would benefit fisheries resources", when access may be reduced.



Section 6.14.5
Discussion, in this section or another, may be warranted regarding non-structural alternatives including but not limited, elevating structures and roads.

LDWF7

Section 6.16.2
There are concerns that the boating access issue is not adequately addressed with respect t frequency of closures. Also, the document did not seem to address recreational and commercia boats being trapped outside the system during storm events, subsequent closures and associated economic impacts.

LDWF8

Louisiana Natural Heritage Program:
Our Natural Heritage Program (LNHP) records indicate that the proposed project may potentially impact a Bald Eagle (*Haliaeetus leucocephalus*) nesting site. This species is protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) and the Migratory Bird Treaty Act (16 U.S.C. 703-712) and is protected by the state of Louisiana. This proposed project is less than 1,000 ft. away from the bald eagle nest of concern. All bald eagle nests (active, inactive or seemingly abandoned) should be protected, and no large trees should be removed. Please refer to the Bald Eagle Management Guidelines for more information on avoiding impacts to bald eagles: http://www.fws.gov/southeast/es/baldeagle/. If additional information is needed contact the LNHP zoologist at 337-491-2576 Ext 3019.

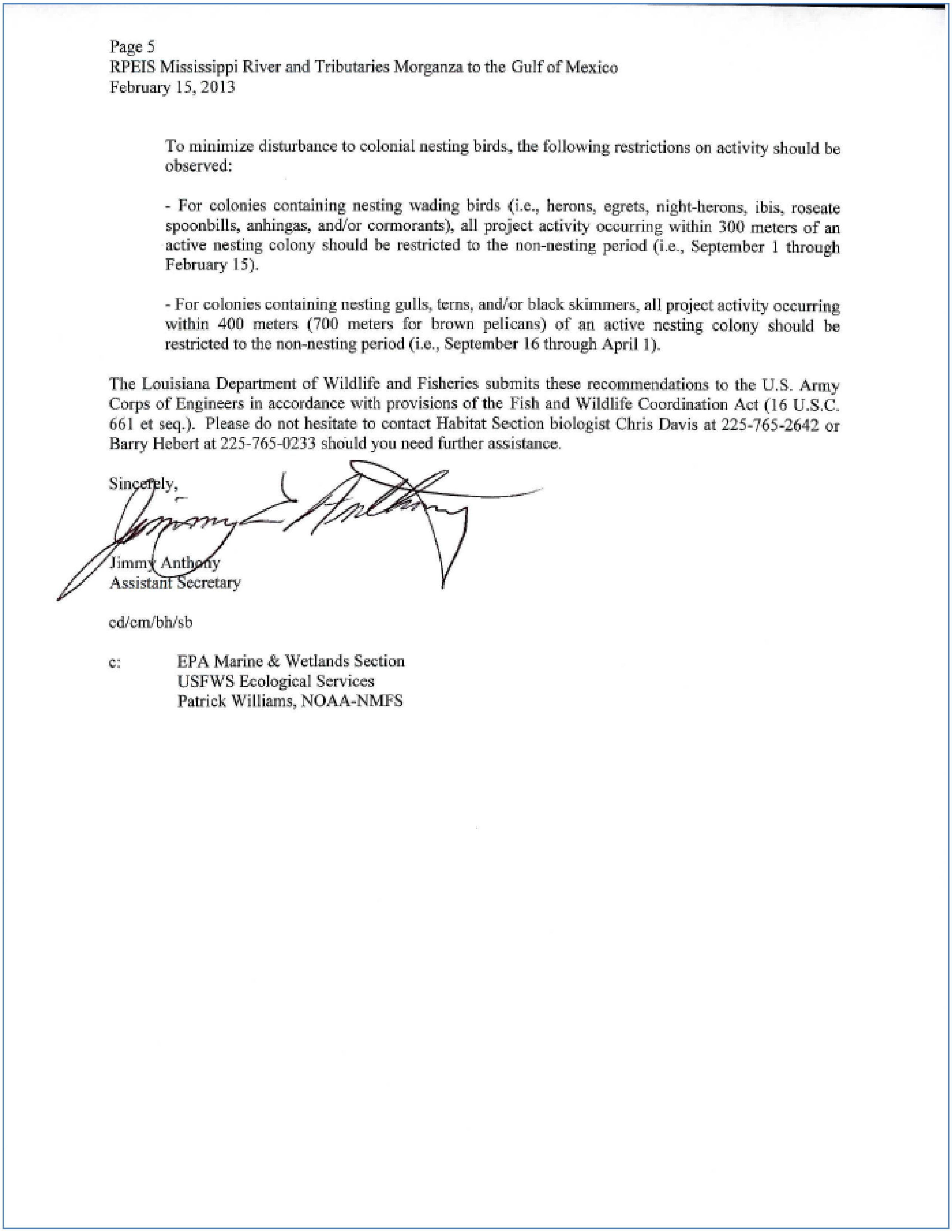
LDWF9

Our LNHP database indicates the presence of bird nesting colonies within one mile of this proposed project. **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 (700 meters for brown pelicans) 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. In addition, colonies should be surveyed by a qualified biologist to document species present and the extent of colonies. Provide LDWF with a survey report which is to include the following information:

1. qualifications of survey personnel;
2. survey methodology including dates, site characteristics, and size of survey area;
3. species of birds present, activity, estimates of number of nests present, and general vegetation type including digital photographs representing the site; and
4. topographic maps and ArcView shapefiles projected in UTM NAD83 Zone 15 to illustrate the location and extent of the colony.

Please mail survey reports on CD to: Louisiana Natural Heritage Program
La. Dept. of Wildlife & Fisheries
P.O. Box 98000
Baton Rouge, LA 70898-9000



> 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 (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).

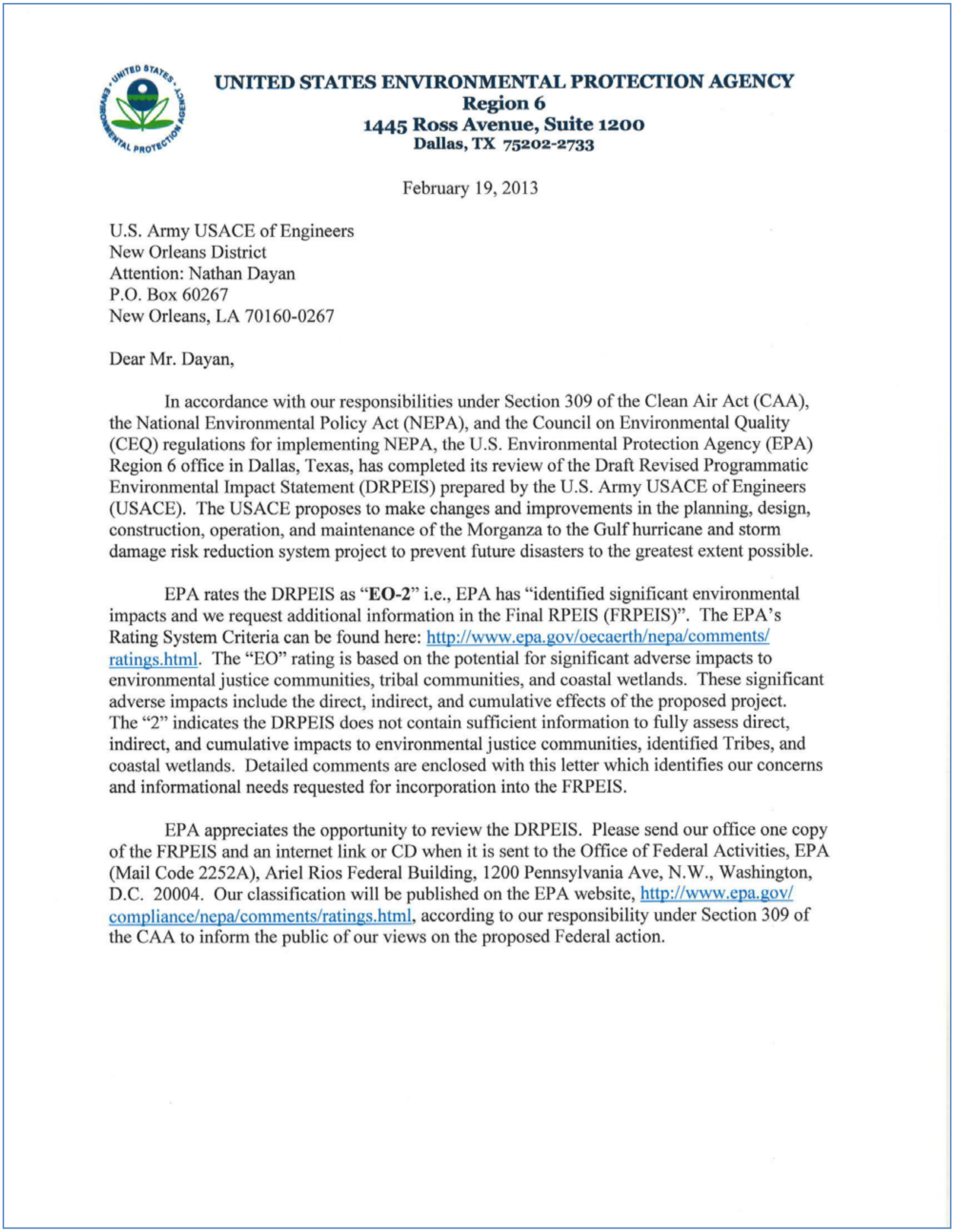
The Louisiana Department of Wildlife and Fisheries submits these recommendations to the U.S. Army Corps of Engineers in accordance with provisions of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). Please do not hesitate to contact Habitat Section biologist Chris Davis at 225-765-2642 or Barry Hebert at 225-765-0233 should you need further assistance.

Sincerely,

Jimmy Anthony
Assistant Secretary

cd/cm/bh/sb

c: EPA Marine & Wetlands Section
USFWS Ecological Services
Patrick Williams, NOAA-NMFS



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

February 19, 2013

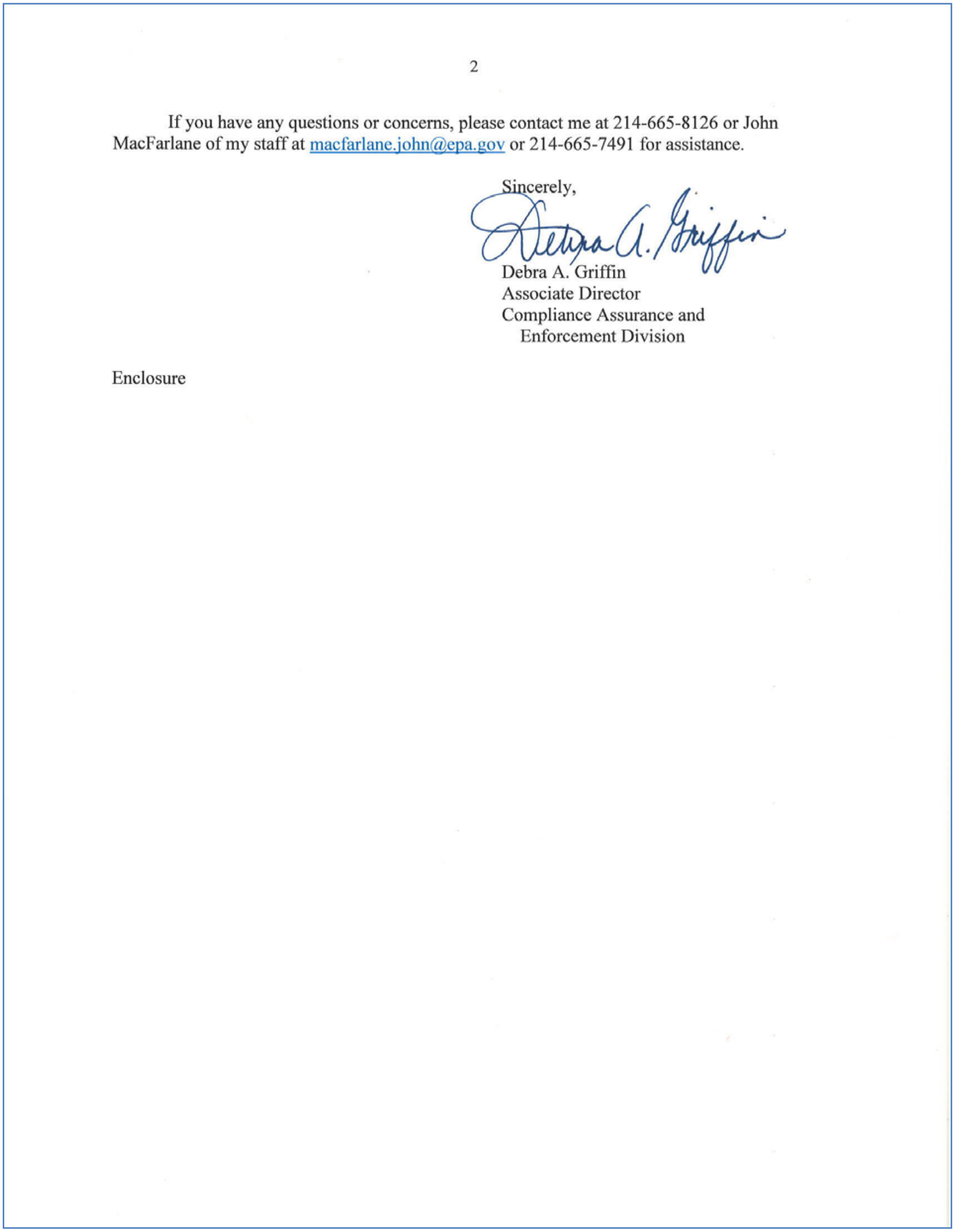
U.S. Army USACE of Engineers
New Orleans District
Attention: Nathan Dayan
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Dayan,

In accordance with our responsibilities under Section 309 of the Clean Air Act (CAA), the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) regulations for implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the Draft Revised Programmatic Environmental Impact Statement (DRPEIS) prepared by the U.S. Army USACE of Engineers (USACE). The USACE proposes to make changes and improvements in the planning, design, construction, operation, and maintenance of the Morganza to the Gulf hurricane and storm damage risk reduction system project to prevent future disasters to the greatest extent possible.

EPA rates the DRPEIS as "**EO-2**" i.e., EPA has "identified significant environmental impacts and we request additional information in the Final RPEIS (FRPEIS)". The EPA's Rating System Criteria can be found here: http://www.epa.gov/oecaerth/nepa/comments/ratings.html. The "EO" rating is based on the potential for significant adverse impacts to environmental justice communities, tribal communities, and coastal wetlands. These significant adverse impacts include the direct, indirect, and cumulative effects of the proposed project. The "2" indicates the DRPEIS does not contain sufficient information to fully assess direct, indirect, and cumulative impacts to environmental justice communities, identified Tribes, and coastal wetlands. Detailed comments are enclosed with this letter which identifies our concerns and informational needs requested for incorporation into the FRPEIS.

EPA appreciates the opportunity to review the DRPEIS. Please send our office one copy of the FRPEIS and an internet link or CD when it is sent to the Office of Federal Activities, EPA (Mail Code 2252A), Ariel Rios Federal Building, 1200 Pennsylvania Ave, N.W., Washington, D.C. 20004. Our classification will be published on the EPA website, http://www.epa.gov/compliance/nepa/comments/ratings.html, according to our responsibility under Section 309 of the CAA to inform the public of our views on the proposed Federal action.



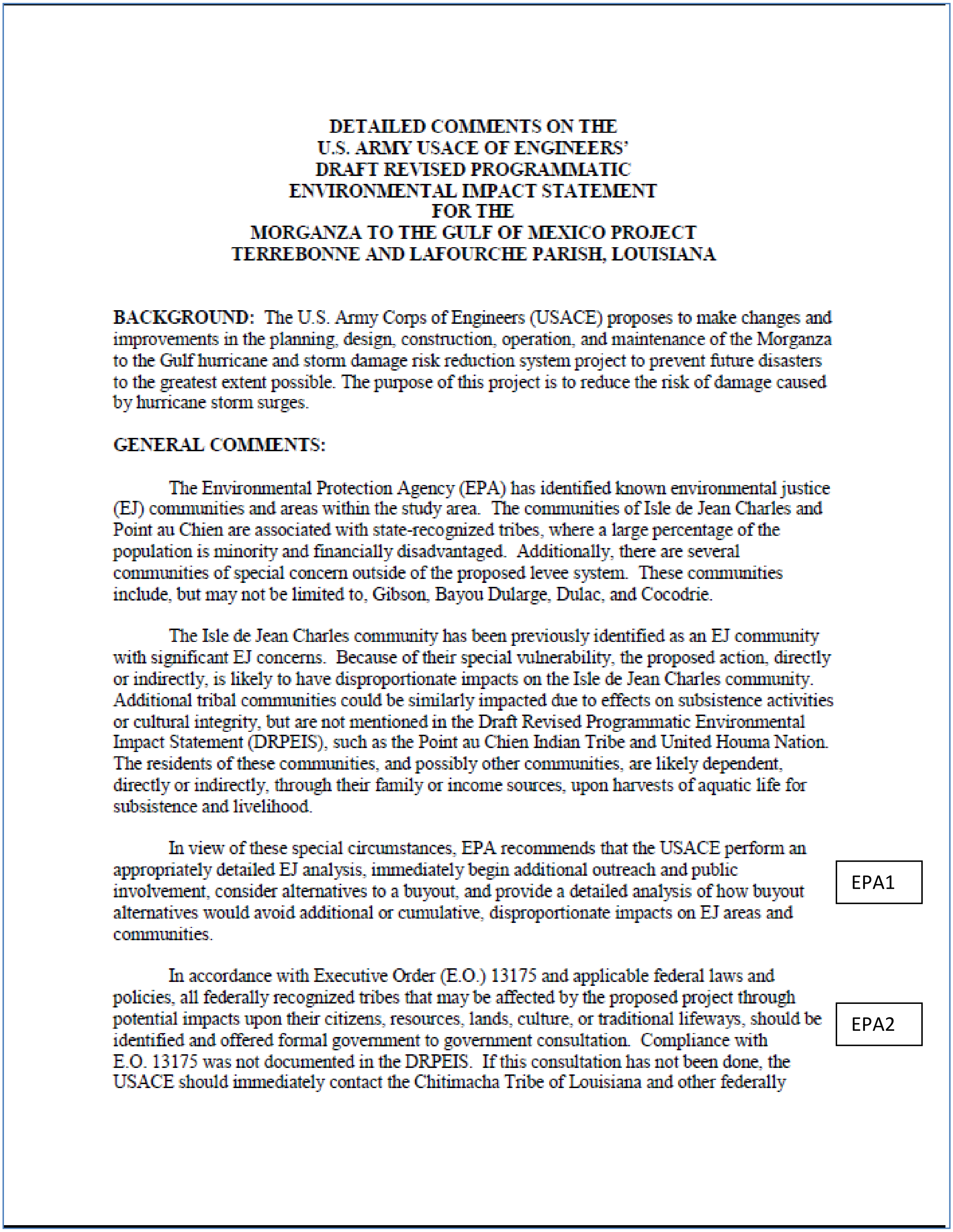
If you have any questions or concerns, please contact me at 214-665-8126 or John MacFarlane of my staff at macfarlane.john@epa.gov or 214-665-7491 for assistance.

Sincerely,

Debra A. Griffin

Debra A. Griffin
Associate Director
Compliance Assurance and
Enforcement Division

Enclosure



DETAILED COMMENTS ON THE
U.S. ARMY USACE OF ENGINEERS'
DRAFT REVISED PROGRAMMATIC
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
MORGANZA TO THE GULF OF MEXICO PROJECT
TERREBONNE AND LAFOURCHE PARISH, LOUISIANA

BACKGROUND: The U.S. Army Corps of Engineers (USACE) proposes to make changes and improvements in the planning, design, construction, operation, and maintenance of the Morganza to the Gulf hurricane and storm damage risk reduction system project to prevent future disasters to the greatest extent possible. The purpose of this project is to reduce the risk of damage caused by hurricane storm surges.

GENERAL COMMENTS:

The Environmental Protection Agency (EPA) has identified known environmental justice (EJ) communities and areas within the study area. The communities of Isle de Jean Charles and Point au Chien are associated with state-recognized tribes, where a large percentage of the population is minority and financially disadvantaged. Additionally, there are several communities of special concern outside of the proposed levee system. These communities include, but may not be limited to, Gibson, Bayou Dularge, Dulac, and Cocodrie.

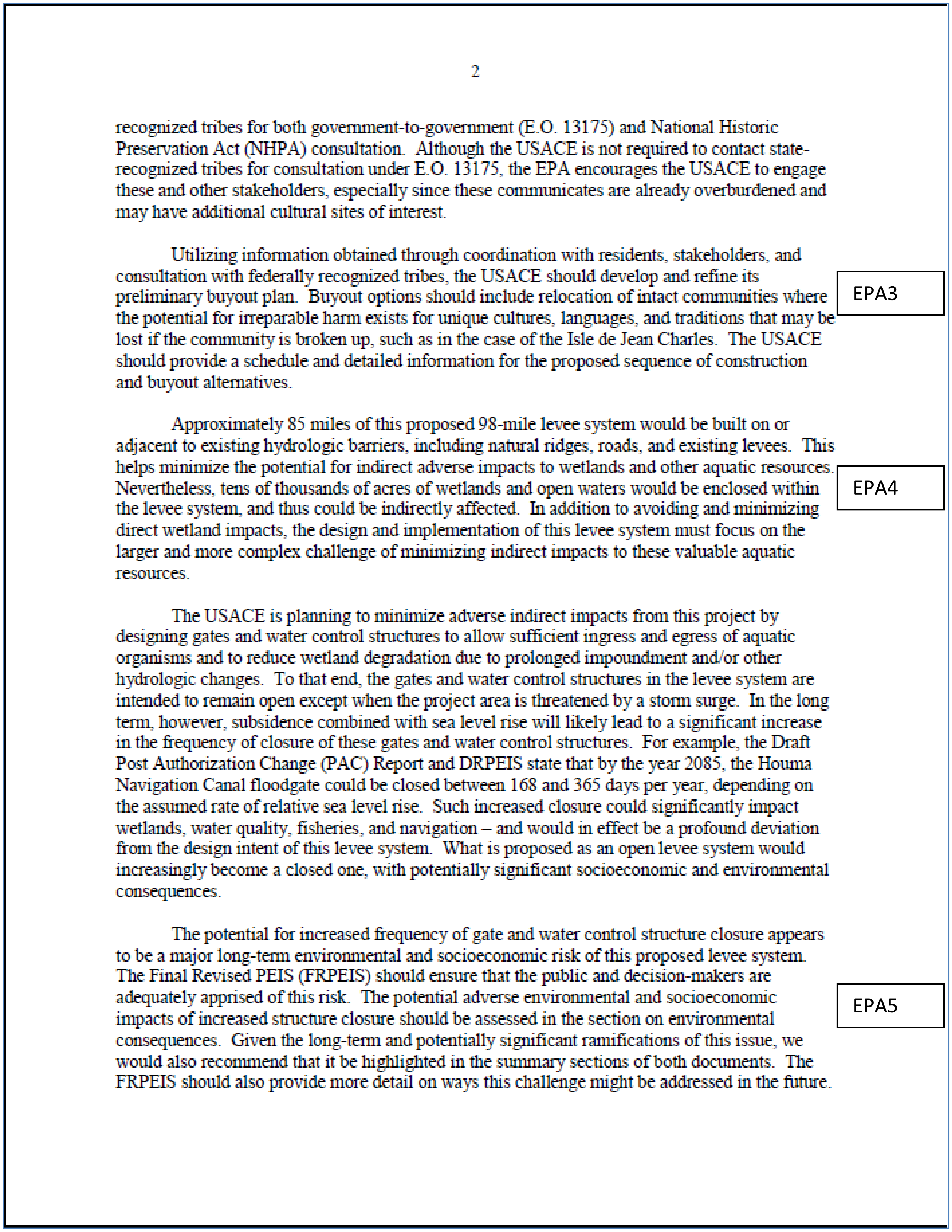
The Isle de Jean Charles community has been previously identified as an EJ community with significant EJ concerns. Because of their special vulnerability, the proposed action, directly or indirectly, is likely to have disproportionate impacts on the Isle de Jean Charles community. Additional tribal communities could be similarly impacted due to effects on subsistence activities or cultural integrity, but are not mentioned in the Draft Revised Programmatic Environmental Impact Statement (DRPEIS), such as the Point au Chien Indian Tribe and United Houma Nation. The residents of these communities, and possibly other communities, are likely dependent, directly or indirectly, through their family or income sources, upon harvests of aquatic life for subsistence and livelihood.

In view of these special circumstances, EPA recommends that the USACE perform an appropriately detailed EJ analysis, immediately begin additional outreach and public involvement, consider alternatives to a buyout, and provide a detailed analysis of how buyout alternatives would avoid additional or cumulative, disproportionate impacts on EJ areas and communities.

EPA1

In accordance with Executive Order (E.O.) 13175 and applicable federal laws and policies, all federally recognized tribes that may be affected by the proposed project through potential impacts upon their citizens, resources, lands, culture, or traditional lifeways, should be identified and offered formal government to government consultation. Compliance with E.O. 13175 was not documented in the DRPEIS. If this consultation has not been done, the USACE should immediately contact the Chitimacha Tribe of Louisiana and other federally

EPA2



recognized tribes for both government-to-government (E.O. 13175) and National Historic Preservation Act (NHPA) consultation. Although the USACE is not required to contact state-recognized tribes for consultation under E.O. 13175, the EPA encourages the USACE to engage these and other stakeholders, especially since these communicates are already overburdened and may have additional cultural sites of interest.

Utilizing information obtained through coordination with residents, stakeholders, and consultation with federally recognized tribes, the USACE should develop and refine its preliminary buyout plan. Buyout options should include relocation of intact communities where the potential for irreparable harm exists for unique cultures, languages, and traditions that may be lost if the community is broken up, such as in the case of the Isle de Jean Charles. The USACE should provide a schedule and detailed information for the proposed sequence of construction and buyout alternatives.

EPA3

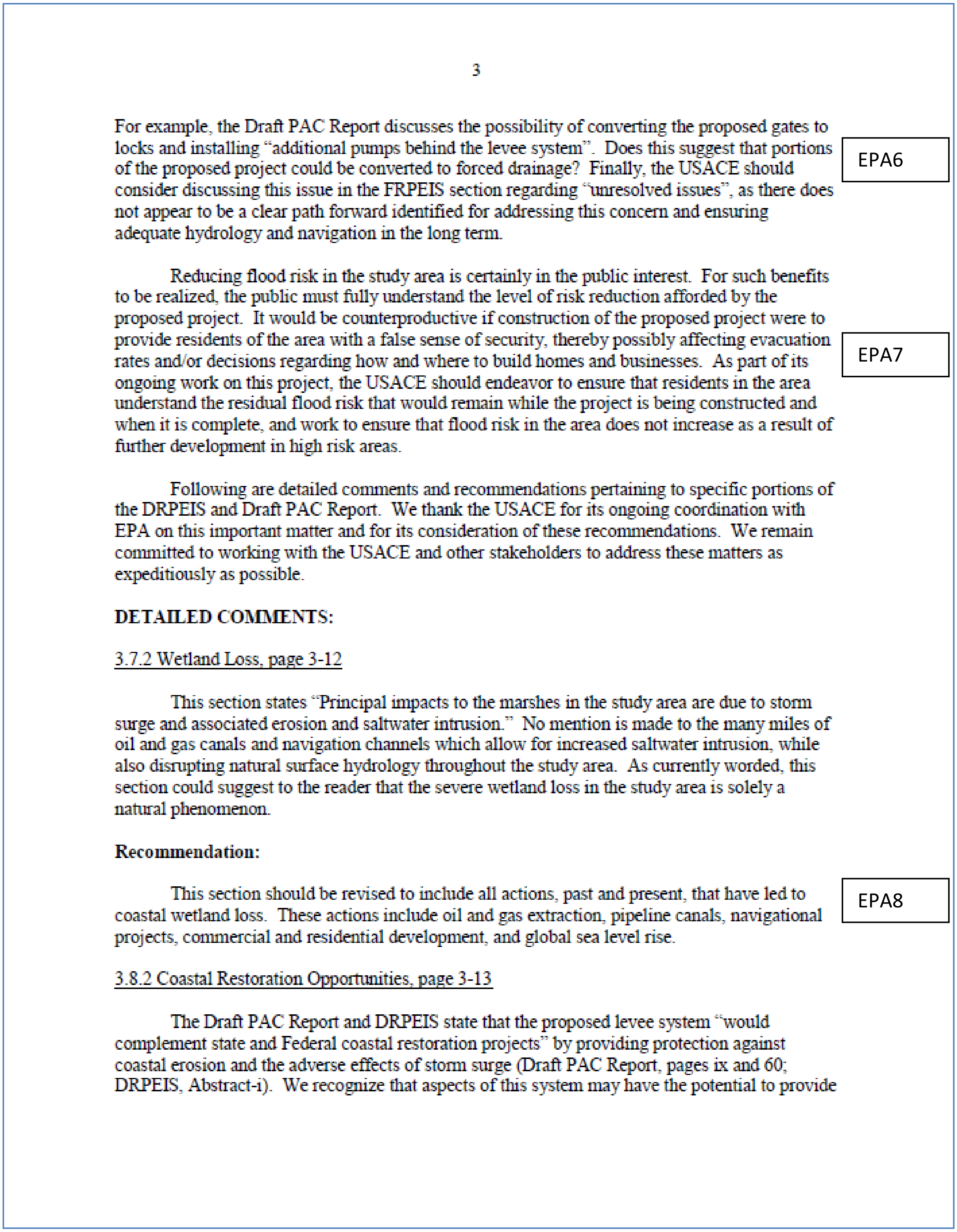
Approximately 85 miles of this proposed 98-mile levee system would be built on or adjacent to existing hydrologic barriers, including natural ridges, roads, and existing levees. This helps minimize the potential for indirect adverse impacts to wetlands and other aquatic resources. Nevertheless, tens of thousands of acres of wetlands and open waters would be enclosed within the levee system, and thus could be indirectly affected. In addition to avoiding and minimizing direct wetland impacts, the design and implementation of this levee system must focus on the larger and more complex challenge of minimizing indirect impacts to these valuable aquatic resources.

EPA4

The USACE is planning to minimize adverse indirect impacts from this project by designing gates and water control structures to allow sufficient ingress and egress of aquatic organisms and to reduce wetland degradation due to prolonged impoundment and/or other hydrologic changes. To that end, the gates and water control structures in the levee system are intended to remain open except when the project area is threatened by a storm surge. In the long term, however, subsidence combined with sea level rise will likely lead to a significant increase in the frequency of closure of these gates and water control structures. For example, the Draft Post Authorization Change (PAC) Report and DRPEIS state that by the year 2085, the Houma Navigation Canal floodgate could be closed between 168 and 365 days per year, depending on the assumed rate of relative sea level rise. Such increased closure could significantly impact wetlands, water quality, fisheries, and navigation – and would in effect be a profound deviation from the design intent of this levee system. What is proposed as an open levee system would increasingly become a closed one, with potentially significant socioeconomic and environmental consequences.

The potential for increased frequency of gate and water control structure closure appears to be a major long-term environmental and socioeconomic risk of this proposed levee system. The Final Revised PEIS (FRPEIS) should ensure that the public and decision-makers are adequately apprised of this risk. The potential adverse environmental and socioeconomic impacts of increased structure closure should be assessed in the section on environmental consequences. Given the long-term and potentially significant ramifications of this issue, we would also recommend that it be highlighted in the summary sections of both documents. The FRPEIS should also provide more detail on ways this challenge might be addressed in the future.

EPA5



For example, the Draft PAC Report discusses the possibility of converting the proposed gates to locks and installing "additional pumps behind the levee system". Does this suggest that portions of the proposed project could be converted to forced drainage? Finally, the USACE should consider discussing this issue in the FRPEIS section regarding "unresolved issues", as there does not appear to be a clear path forward identified for addressing this concern and ensuring adequate hydrology and navigation in the long term.

EPA6

Reducing flood risk in the study area is certainly in the public interest. For such benefits to be realized, the public must fully understand the level of risk reduction afforded by the proposed project. It would be counterproductive if construction of the proposed project were to provide residents of the area with a false sense of security, thereby possibly affecting evacuation rates and/or decisions regarding how and where to build homes and businesses. As part of its ongoing work on this project, the USACE should endeavor to ensure that residents in the area understand the residual flood risk that would remain while the project is being constructed and when it is complete, and work to ensure that flood risk in the area does not increase as a result of further development in high risk areas.

EPA7

Following are detailed comments and recommendations pertaining to specific portions of the DRPEIS and Draft PAC Report. We thank the USACE for its ongoing coordination with EPA on this important matter and for its consideration of these recommendations. We remain committed to working with the USACE and other stakeholders to address these matters as expeditiously as possible.

DETAILED COMMENTS:

3.7.2 Wetland Loss, page 3-12

This section states "Principal impacts to the marshes in the study area are due to storm surge and associated erosion and saltwater intrusion." No mention is made to the many miles of oil and gas canals and navigation channels which allow for increased saltwater intrusion, while also disrupting natural surface hydrology throughout the study area. As currently worded, this section could suggest to the reader that the severe wetland loss in the study area is solely a natural phenomenon.

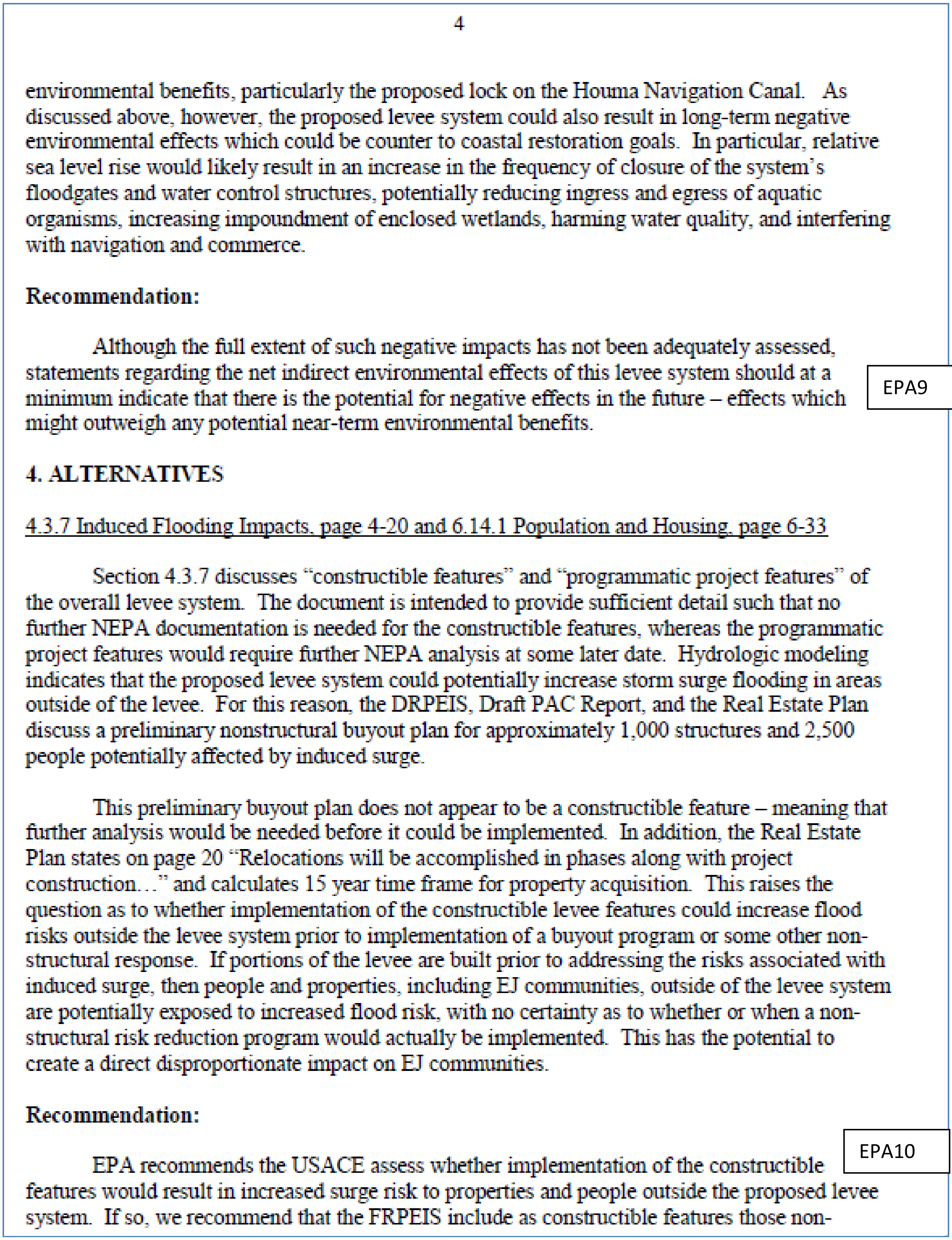
Recommendation:

This section should be revised to include all actions, past and present, that have led to coastal wetland loss. These actions include oil and gas extraction, pipeline canals, navigational projects, commercial and residential development, and global sea level rise.

EPA8

3.8.2 Coastal Restoration Opportunities, page 3-13

The Draft PAC Report and DRPEIS state that the proposed levee system "would complement state and Federal coastal restoration projects" by providing protection against coastal erosion and the adverse effects of storm surge (Draft PAC Report, pages ix and 60; DRPEIS, Abstract-i). We recognize that aspects of this system may have the potential to provide



environmental benefits, particularly the proposed lock on the Houma Navigation Canal. As discussed above, however, the proposed levee system could also result in long-term negative environmental effects which could be counter to coastal restoration goals. In particular, relative sea level rise would likely result in an increase in the frequency of closure of the system's floodgates and water control structures, potentially reducing ingress and egress of aquatic organisms, increasing impoundment of enclosed wetlands, harming water quality, and interfering with navigation and commerce.

Recommendation:

Although the full extent of such negative impacts has not been adequately assessed, statements regarding the net indirect environmental effects of this levee system should at a minimum indicate that there is the potential for negative effects in the future – effects which might outweigh any potential near-term environmental benefits.

EPA9

4. ALTERNATIVES

4.3.7 Induced Flooding Impacts, page 4-20 and 6.14.1 Population and Housing, page 6-33

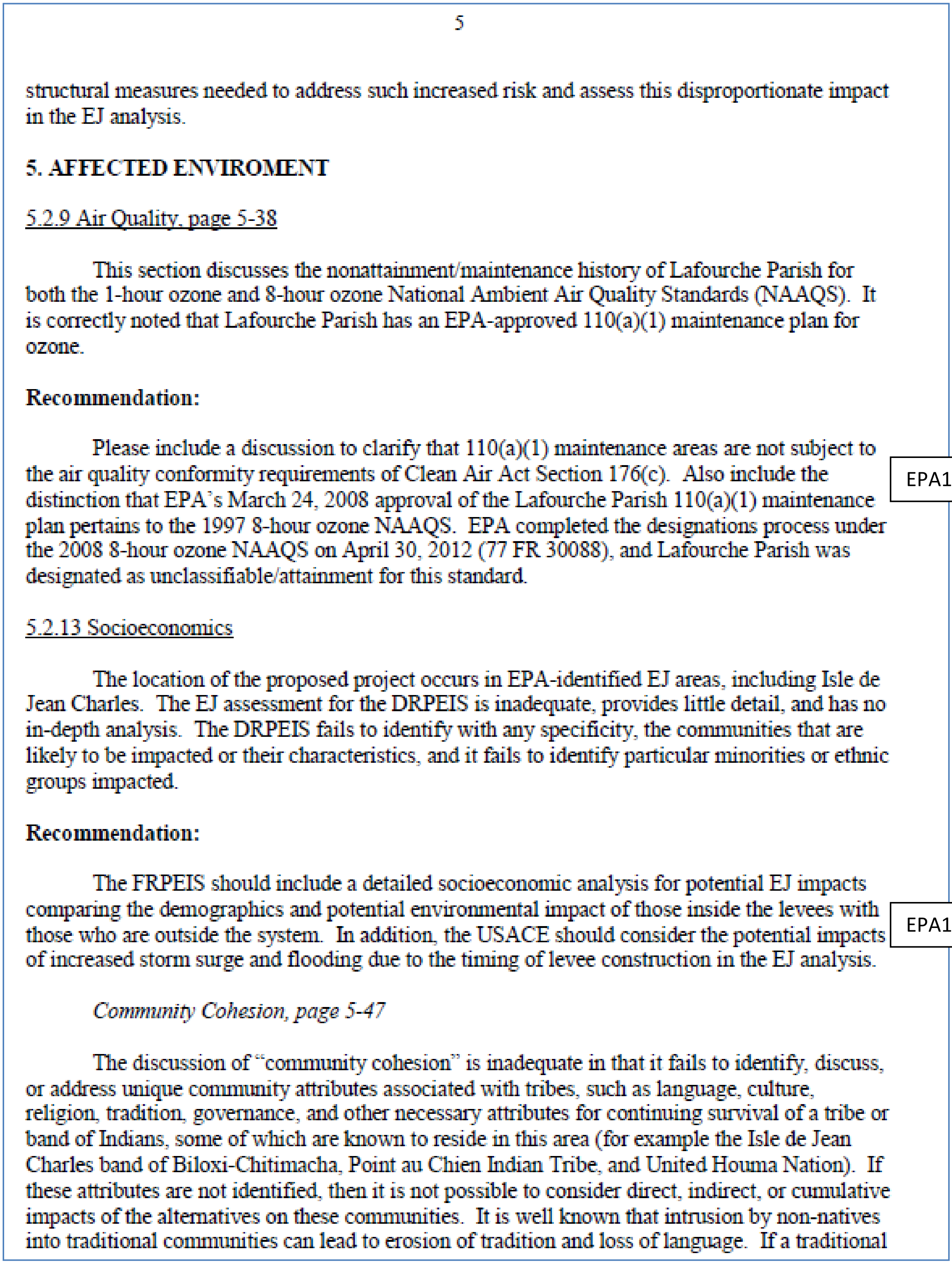
Section 4.3.7 discusses "constructible features" and "programmatic project features" of the overall levee system. The document is intended to provide sufficient detail such that no further NEPA documentation is needed for the constructible features, whereas the programmatic project features would require further NEPA analysis at some later date. Hydrologic modeling indicates that the proposed levee system could potentially increase storm surge flooding in areas outside of the levee. For this reason, the DRPEIS, Draft PAC Report, and the Real Estate Plan discuss a preliminary nonstructural buyout plan for approximately 1,000 structures and 2,500 people potentially affected by induced surge.

This preliminary buyout plan does not appear to be a constructible feature – meaning that further analysis would be needed before it could be implemented. In addition, the Real Estate Plan states on page 20 "Relocations will be accomplished in phases along with project construction…" and calculates 15 year time frame for property acquisition. This raises the question as to whether implementation of the constructible levee features could increase flood risks outside the levee system prior to implementation of a buyout program or some other non-structural response. If portions of the levee are built prior to addressing the risks associated with induced surge, then people and properties, including EJ communities, outside of the levee system are potentially exposed to increased flood risk, with no certainty as to whether or when a non-structural risk reduction program would actually be implemented. This has the potential to create a direct disproportionate impact on EJ communities.

Recommendation:

EPA10

EPA recommends the USACE assess whether implementation of the constructible features would result in increased surge risk to properties and people outside the proposed levee system. If so, we recommend that the FRPEIS include as constructible features those non-



structural measures needed to address such increased risk and assess this disproportionate impact in the EJ analysis.

5. AFFECTED ENVIROMENT

5.2.9 Air Quality, page 5-38

This section discusses the nonattainment/maintenance history of Lafourche Parish for both the 1-hour ozone and 8-hour ozone National Ambient Air Quality Standards (NAAQS). It is correctly noted that Lafourche Parish has an EPA-approved 110(a)(1) maintenance plan for ozone.

Recommendation:

Please include a discussion to clarify that 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). Also include the distinction that EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard.

EPA11

5.2.13 Socioeconomics

The location of the proposed project occurs in EPA-identified EJ areas, including Isle de Jean Charles. The EJ assessment for the DRPEIS is inadequate, provides little detail, and has no in-depth analysis. The DRPEIS fails to identify with any specificity, the communities that are likely to be impacted or their characteristics, and it fails to identify particular minorities or ethnic groups impacted.

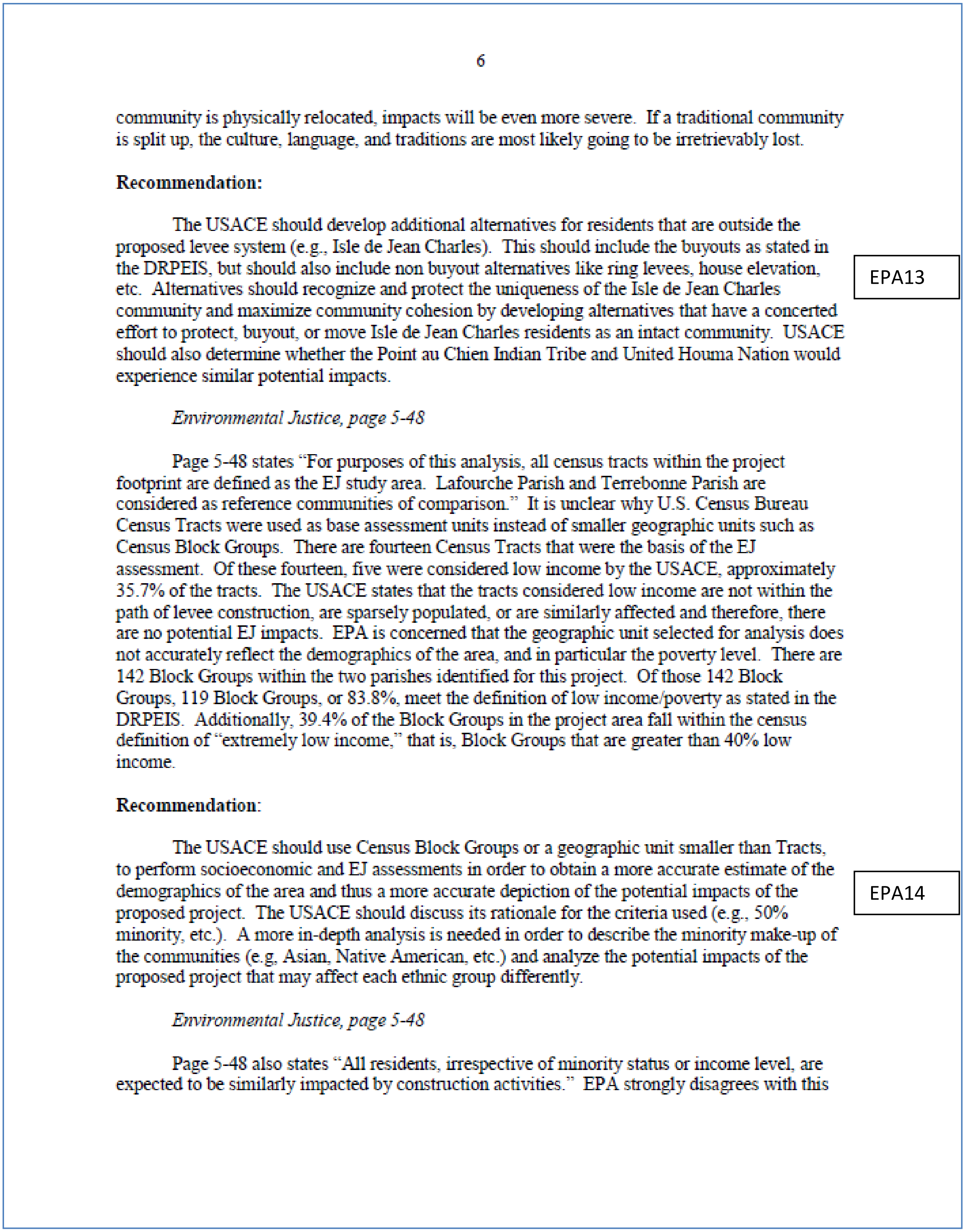
Recommendation:

The FRPEIS should include a detailed socioeconomic analysis for potential EJ impacts comparing the demographics and potential environmental impact of those inside the levees with those who are outside the system. In addition, the USACE should consider the potential impacts of increased storm surge and flooding due to the timing of levee construction in the EJ analysis.

EPA12

Community Cohesion, page 5-47

The discussion of "community cohesion" is inadequate in that it fails to identify, discuss, or address unique community attributes associated with tribes, such as language, culture, religion, tradition, governance, and other necessary attributes for continuing survival of a tribe or band of Indians, some of which are known to reside in this area (for example the Isle de Jean Charles band of Biloxi-Chitimacha, Point au Chien Indian Tribe, and United Houma Nation). If these attributes are not identified, then it is not possible to consider direct, indirect, or cumulative impacts of the alternatives on these communities. It is well known that intrusion by non-natives into traditional communities can lead to erosion of tradition and loss of language. If a traditional



community is physically relocated, impacts will be even more severe. If a traditional community is split up, the culture, language, and traditions are most likely going to be irretrievably lost.

Recommendation:

EPA13

The USACE should develop additional alternatives for residents that are outside the proposed levee system (e.g., Isle de Jean Charles). This should include the buyouts as stated in the DRPEIS, but should also include non buyout alternatives like ring levees, house elevation, etc. Alternatives should recognize and protect the uniqueness of the Isle de Jean Charles community and maximize community cohesion by developing alternatives that have a concerted effort to protect, buyout, or move Isle de Jean Charles residents as an intact community. USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts.

Environmental Justice, page 5-48

Page 5-48 states "For purposes of this analysis, all census tracts within the project footprint are defined as the EJ study area. Lafourche Parish and Terrebonne Parish are considered as reference communities of comparison." It is unclear why U.S. Census Bureau Census Tracts were used as base assessment units instead of smaller geographic units such as Census Block Groups. There are fourteen Census Tracts that were the basis of the EJ assessment. Of these fourteen, five were considered low income by the USACE, approximately 35.7% of the tracts. The USACE states that the tracts considered low income are not within the path of levee construction, are sparsely populated, or are similarly affected and therefore, there are no potential EJ impacts. EPA is concerned that the geographic unit selected for analysis does not accurately reflect the demographics of the area, and in particular the poverty level. There are 142 Block Groups within the two parishes identified for this project. Of those 142 Block Groups, 119 Block Groups, or 83.8%, meet the definition of low income/poverty as stated in the DRPEIS. Additionally, 39.4% of the Block Groups in the project area fall within the census definition of "extremely low income," that is, Block Groups that are greater than 40% low income.

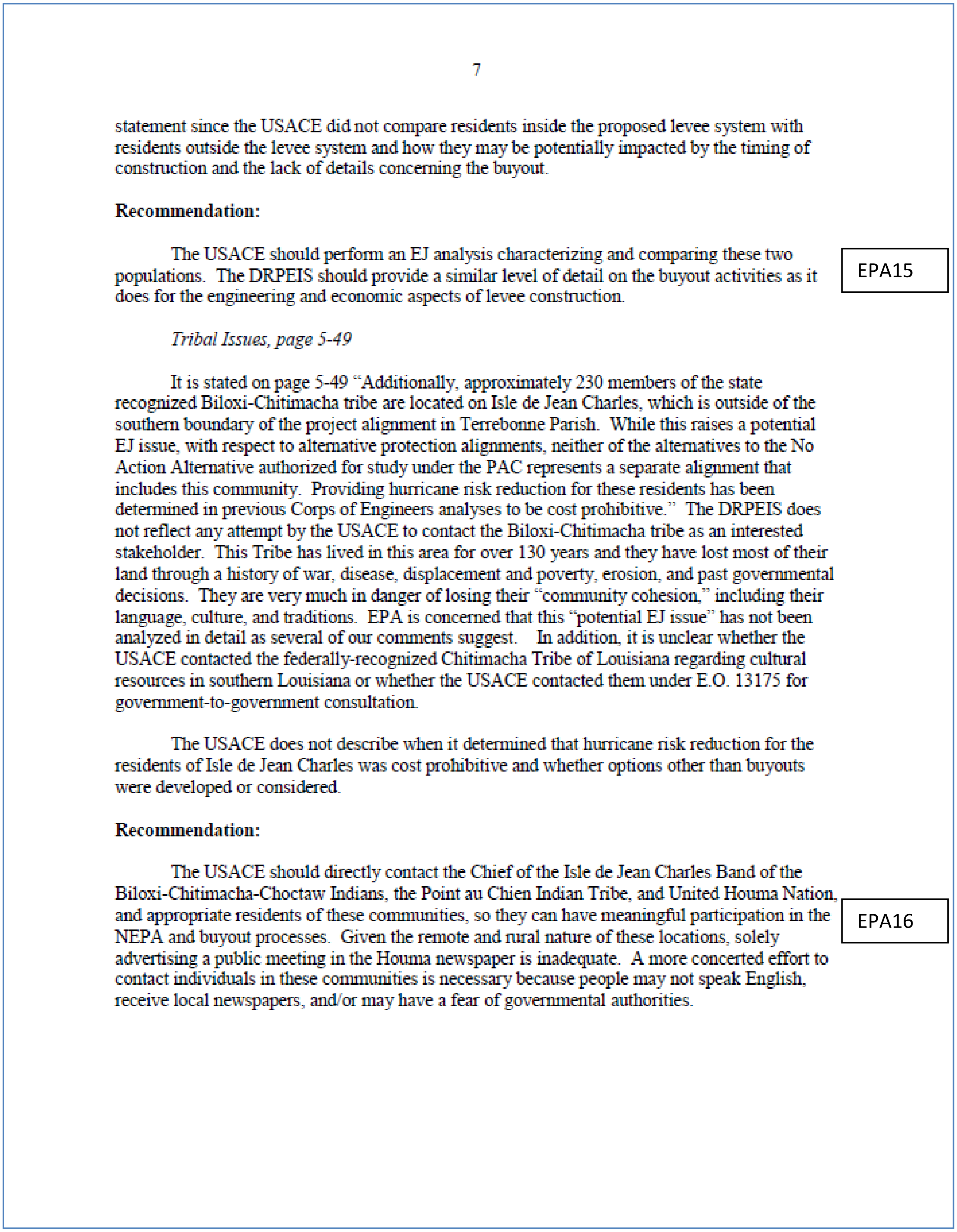
Recommendation:

EPA14

The USACE should use Census Block Groups or a geographic unit smaller than Tracts, to perform socioeconomic and EJ assessments in order to obtain a more accurate estimate of the demographics of the area and thus a more accurate depiction of the potential impacts of the proposed project. The USACE should discuss its rationale for the criteria used (e.g., 50% minority, etc.). A more in-depth analysis is needed in order to describe the minority make-up of the communities (e.g, Asian, Native American, etc.) and analyze the potential impacts of the proposed project that may affect each ethnic group differently.

Environmental Justice, page 5-48

Page 5-48 also states "All residents, irrespective of minority status or income level, are expected to be similarly impacted by construction activities." EPA strongly disagrees with this



statement since the USACE did not compare residents inside the proposed levee system with residents outside the levee system and how they may be potentially impacted by the timing of construction and the lack of details concerning the buyout.

Recommendation:

The USACE should perform an EJ analysis characterizing and comparing these two populations. The DRPEIS should provide a similar level of detail on the buyout activities as it does for the engineering and economic aspects of levee construction.

EPA15

Tribal Issues, page 5-49

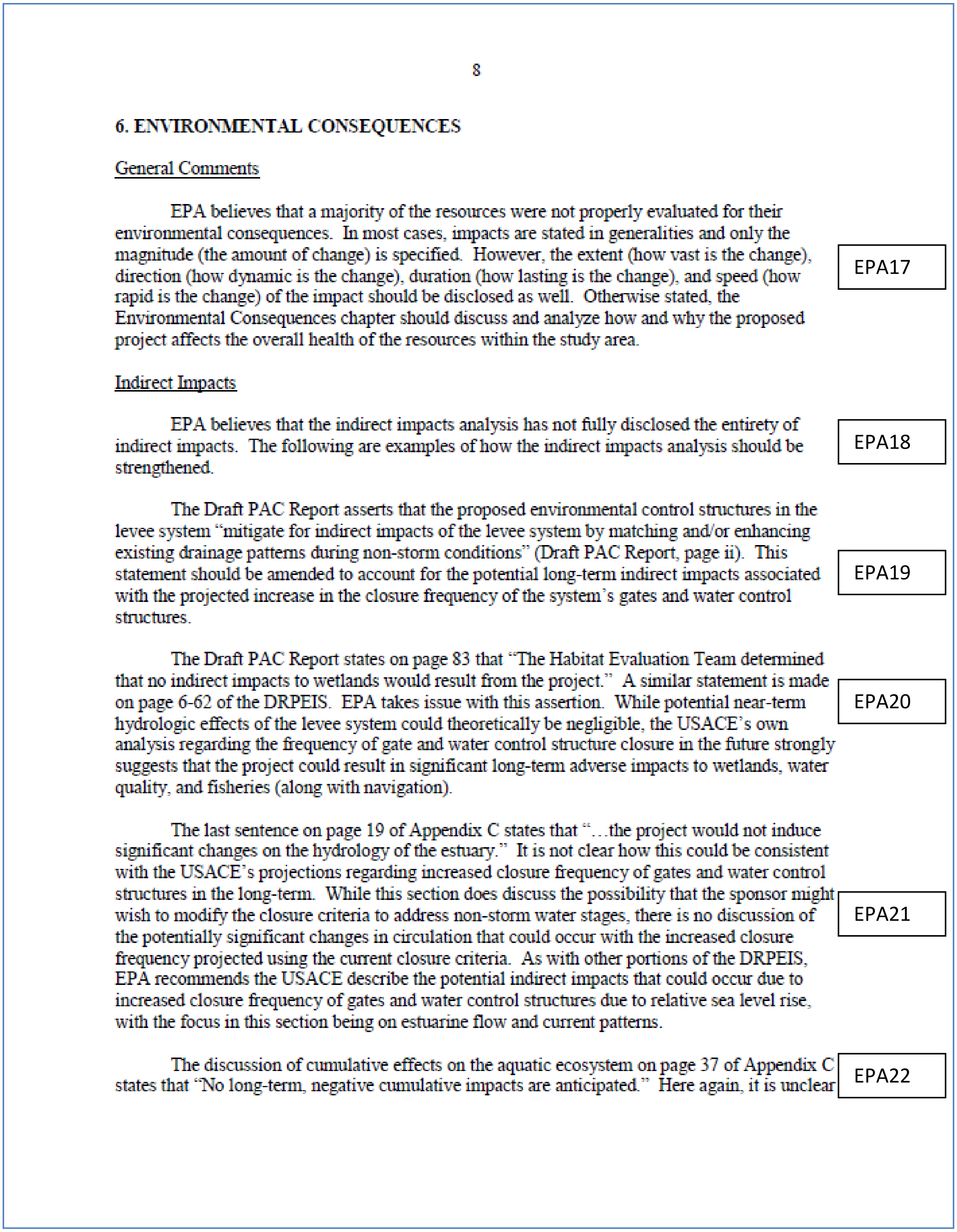
It is stated on page 5-49 "Additionally, approximately 230 members of the state recognized Biloxi-Chitimacha tribe are located on Isle de Jean Charles, which is outside of the southern boundary of the project alignment in Terrebonne Parish. While this raises a potential EJ issue, with respect to alternative protection alignments, neither of the alternatives to the No Action Alternative authorized for study under the PAC represents a separate alignment that includes this community. Providing hurricane risk reduction for these residents has been determined in previous Corps of Engineers analyses to be cost prohibitive." The DRPEIS does not reflect any attempt by the USACE to contact the Biloxi-Chitimacha tribe as an interested stakeholder. This Tribe has lived in this area for over 130 years and they have lost most of their land through a history of war, disease, displacement and poverty, erosion, and past governmental decisions. They are very much in danger of losing their "community cohesion," including their language, culture, and traditions. EPA is concerned that this "potential EJ issue" has not been analyzed in detail as several of our comments suggest. In addition, it is unclear whether the USACE contacted the federally-recognized Chitimacha Tribe of Louisiana regarding cultural resources in southern Louisiana or whether the USACE contacted them under E.O. 13175 for government-to-government consultation.

The USACE does not describe when it determined that hurricane risk reduction for the residents of Isle de Jean Charles was cost prohibitive and whether options other than buyouts were developed or considered.

Recommendation:

The USACE should directly contact the Chief of the Isle de Jean Charles Band of the Biloxi-Chitimacha-Choctaw Indians, the Point au Chien Indian Tribe, and United Houma Nation, and appropriate residents of these communities, so they can have meaningful participation in the NEPA and buyout processes. Given the remote and rural nature of these locations, solely advertising a public meeting in the Houma newspaper is inadequate. A more concerted effort to contact individuals in these communities is necessary because people may not speak English, receive local newspapers, and/or may have a fear of governmental authorities.

EPA16



6. ENVIRONMENTAL CONSEQUENCES

General Comments

EPA believes that a majority of the resources were not properly evaluated for their environmental consequences. In most cases, impacts are stated in generalities and only the magnitude (the amount of change) is specified. However, the extent (how vast is the change), direction (how dynamic is the change), duration (how lasting is the change), and speed (how rapid is the change) of the impact should be disclosed as well. Otherwise stated, the Environmental Consequences chapter should discuss and analyze how and why the proposed project affects the overall health of the resources within the study area.

EPA17

Indirect Impacts

EPA believes that the indirect impacts analysis has not fully disclosed the entirety of indirect impacts. The following are examples of how the indirect impacts analysis should be strengthened.

EPA18

The Draft PAC Report asserts that the proposed environmental control structures in the levee system "mitigate for indirect impacts of the levee system by matching and/or enhancing existing drainage patterns during non-storm conditions" (Draft PAC Report, page ii). This statement should be amended to account for the potential long-term indirect impacts associated with the projected increase in the closure frequency of the system's gates and water control structures.

EPA19

The Draft PAC Report states on page 83 that "The Habitat Evaluation Team determined that no indirect impacts to wetlands would result from the project." A similar statement is made on page 6-62 of the DRPEIS. EPA takes issue with this assertion. While potential near-term hydrologic effects of the levee system could theoretically be negligible, the USACE's own analysis regarding the frequency of gate and water control structure closure in the future strongly suggests that the project could result in significant long-term adverse impacts to wetlands, water quality, and fisheries (along with navigation).

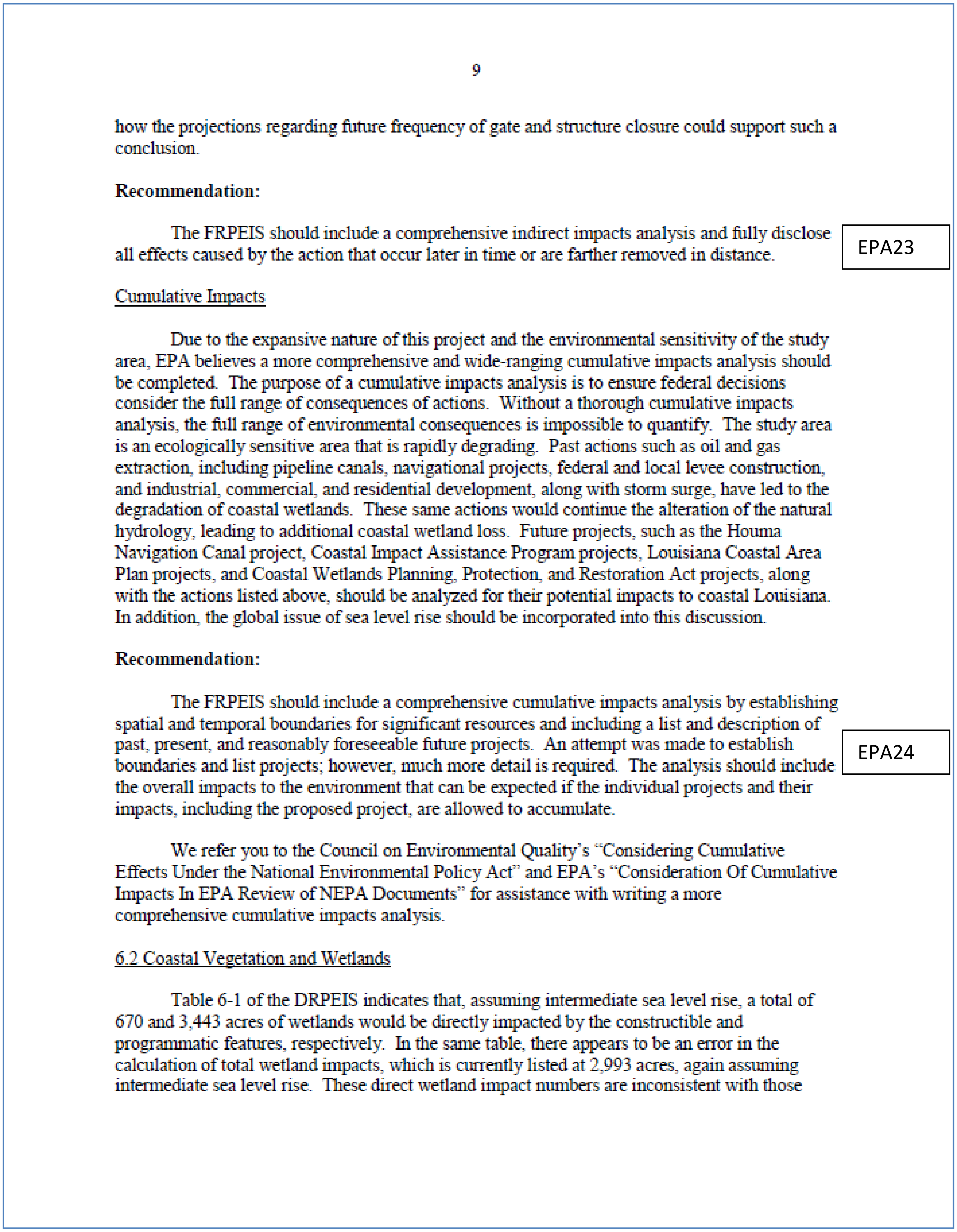
EPA20

The last sentence on page 19 of Appendix C states that "…the project would not induce significant changes on the hydrology of the estuary." It is not clear how this could be consistent with the USACE's projections regarding increased closure frequency of gates and water control structures in the long-term. While this section does discuss the possibility that the sponsor might wish to modify the closure criteria to address non-storm water stages, there is no discussion of the potentially significant changes in circulation that could occur with the increased closure frequency projected using the current closure criteria. As with other portions of the DRPEIS, EPA recommends the USACE describe the potential indirect impacts that could occur due to increased closure frequency of gates and water control structures due to relative sea level rise, with the focus in this section being on estuarine flow and current patterns.

EPA21

The discussion of cumulative effects on the aquatic ecosystem on page 37 of Appendix C states that "No long-term, negative cumulative impacts are anticipated." Here again, it is unclear

EPA22



how the projections regarding future frequency of gate and structure closure could support such a conclusion.

Recommendation:

The FRPEIS should include a comprehensive indirect impacts analysis and fully disclose all effects caused by the action that occur later in time or are farther removed in distance.

EPA23

Cumulative Impacts

Due to the expansive nature of this project and the environmental sensitivity of the study area, EPA believes a more comprehensive and wide-ranging cumulative impacts analysis should be completed. The purpose of a cumulative impacts analysis is to ensure federal decisions consider the full range of consequences of actions. Without a thorough cumulative impacts analysis, the full range of environmental consequences is impossible to quantify. The study area is an ecologically sensitive area that is rapidly degrading. Past actions such as oil and gas extraction, including pipeline canals, navigational projects, federal and local levee construction, and industrial, commercial, and residential development, along with storm surge, have led to the degradation of coastal wetlands. These same actions would continue the alteration of the natural hydrology, leading to additional coastal wetland loss. Future projects, such as the Houma Navigation Canal project, Coastal Impact Assistance Program projects, Louisiana Coastal Area Plan projects, and Coastal Wetlands Planning, Protection, and Restoration Act projects, along with the actions listed above, should be analyzed for their potential impacts to coastal Louisiana. In addition, the global issue of sea level rise should be incorporated into this discussion.

Recommendation:

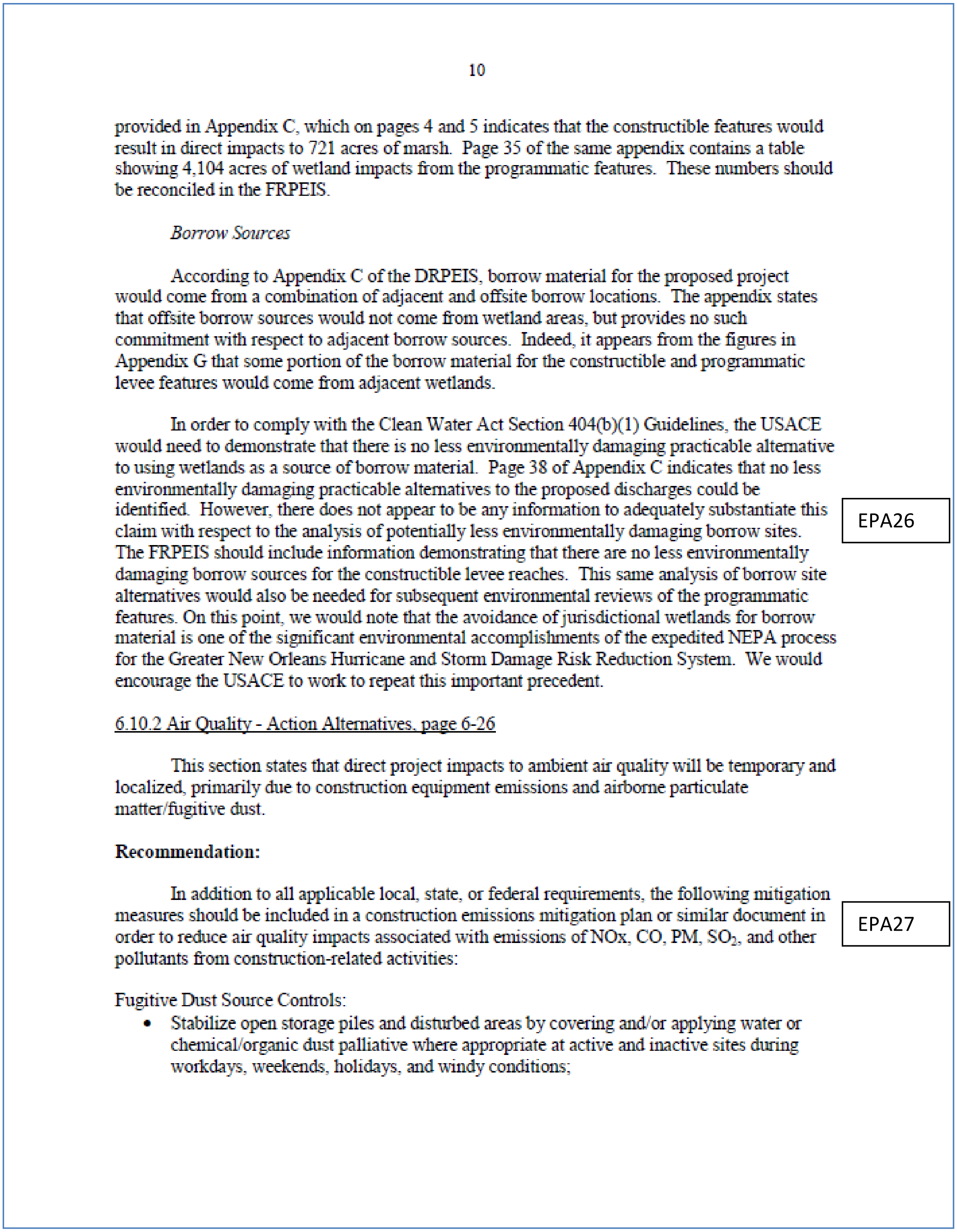
The FRPEIS should include a comprehensive cumulative impacts analysis by establishing spatial and temporal boundaries for significant resources and including a list and description of past, present, and reasonably foreseeable future projects. An attempt was made to establish boundaries and list projects; however, much more detail is required. The analysis should include the overall impacts to the environment that can be expected if the individual projects and their impacts, including the proposed project, are allowed to accumulate.

EPA24

We refer you to the Council on Environmental Quality's "Considering Cumulative Effects Under the National Environmental Policy Act" and EPA's "Consideration Of Cumulative Impacts In EPA Review of NEPA Documents" for assistance with writing a more comprehensive cumulative impacts analysis.

6.2 Coastal Vegetation and Wetlands

Table 6-1 of the DRPEIS indicates that, assuming intermediate sea level rise, a total of 670 and 3,443 acres of wetlands would be directly impacted by the constructible and programmatic features, respectively. In the same table, there appears to be an error in the calculation of total wetland impacts, which is currently listed at 2,993 acres, again assuming intermediate sea level rise. These direct wetland impact numbers are inconsistent with those



provided in Appendix C, which on pages 4 and 5 indicates that the constructible features would result in direct impacts to 721 acres of marsh. Page 35 of the same appendix contains a table showing 4,104 acres of wetland impacts from the programmatic features. These numbers should be reconciled in the FRPEIS.

Borrow Sources

According to Appendix C of the DRPEIS, borrow material for the proposed project would come from a combination of adjacent and offsite borrow locations. The appendix states that offsite borrow sources would not come from wetland areas, but provides no such commitment with respect to adjacent borrow sources. Indeed, it appears from the figures in Appendix G that some portion of the borrow material for the constructible and programmatic levee features would come from adjacent wetlands.

EPA26

In order to comply with the Clean Water Act Section 404(b)(1) Guidelines, the USACE would need to demonstrate that there is no less environmentally damaging practicable alternative to using wetlands as a source of borrow material. Page 38 of Appendix C indicates that no less environmentally damaging practicable alternatives to the proposed discharges could be identified. However, there does not appear to be any information to adequately substantiate this claim with respect to the analysis of potentially less environmentally damaging borrow sites. The FRPEIS should include information demonstrating that there are no less environmentally damaging borrow sources for the constructible levee reaches. This same analysis of borrow site alternatives would also be needed for subsequent environmental reviews of the programmatic features. On this point, we would note that the avoidance of jurisdictional wetlands for borrow material is one of the significant environmental accomplishments of the expedited NEPA process for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System. We would encourage the USACE to work to repeat this important precedent.

<u>6.10.2 Air Quality - Action Alternatives, page 6-26</u>

This section states that direct project impacts to ambient air quality will be temporary and localized, primarily due to construction equipment emissions and airborne particulate matter/fugitive dust.

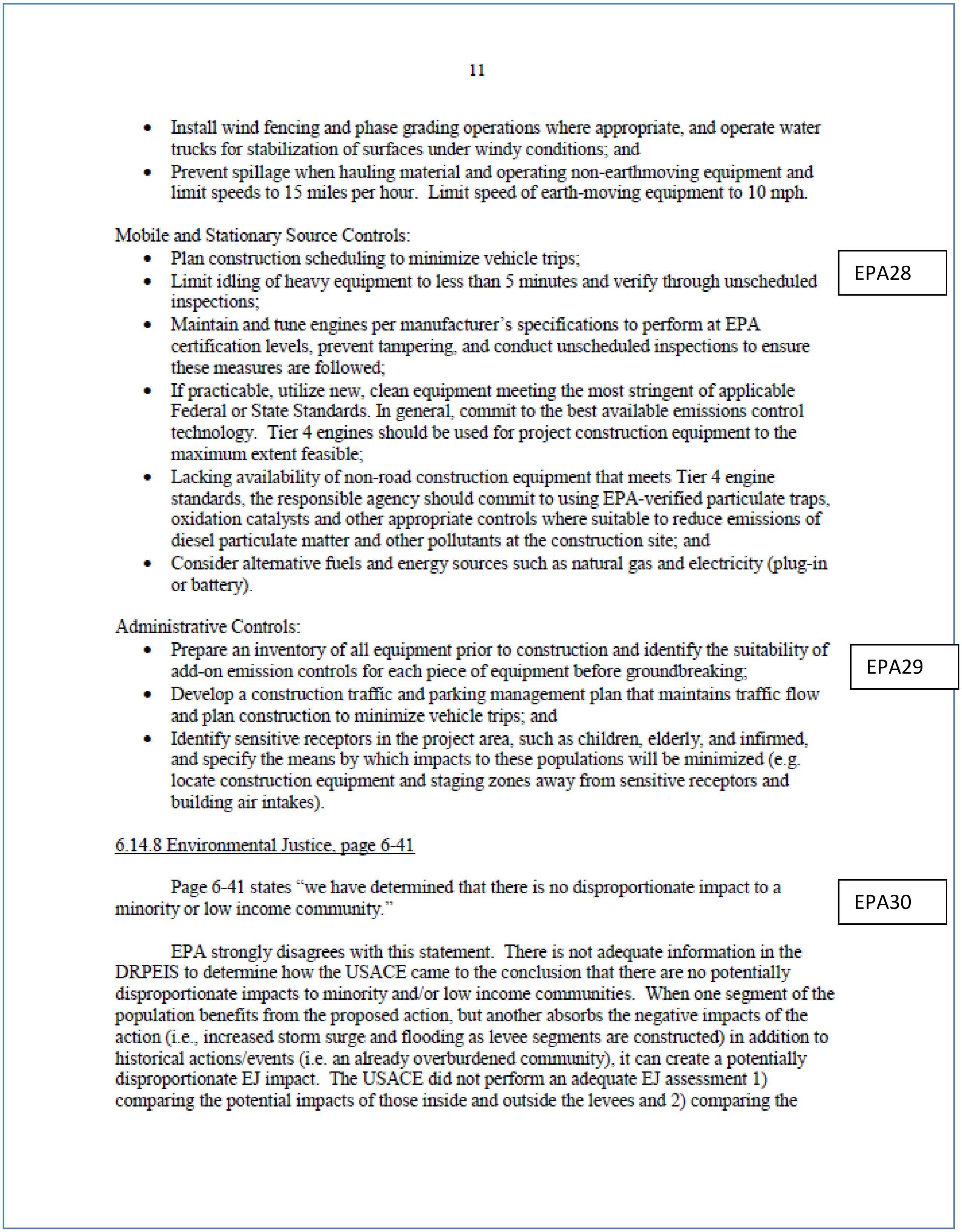
Recommendation:

EPA27

In addition to all applicable local, state, or federal requirements, the following mitigation measures should be included in a construction emissions mitigation plan or similar document in order to reduce air quality impacts associated with emissions of NOx, CO, PM, SO_2, and other pollutants from construction-related activities:

Fugitive Dust Source Controls:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites during workdays, weekends, holidays, and windy conditions;



- Install wind fencing and phase grading operations where appropriate, and operate water trucks for stabilization of surfaces under windy conditions; and
- Prevent spillage when hauling material and operating non-earthmoving equipment and limit speeds to 15 miles per hour. Limit speed of earth-moving equipment to 10 mph.

EPA28

Mobile and Stationary Source Controls:

- Plan construction scheduling to minimize vehicle trips;
- Limit idling of heavy equipment to less than 5 minutes and verify through unscheduled inspections;
- Maintain and tune engines per manufacturer's specifications to perform at EPA certification levels, prevent tampering, and conduct unscheduled inspections to ensure these measures are followed;
- If practicable, utilize new, clean equipment meeting the most stringent of applicable Federal or State Standards. In general, commit to the best available emissions control technology. Tier 4 engines should be used for project construction equipment to the maximum extent feasible;
- Lacking availability of non-road construction equipment that meets Tier 4 engine standards, the responsible agency should commit to using EPA-verified particulate traps, oxidation catalysts and other appropriate controls where suitable to reduce emissions of diesel particulate matter and other pollutants at the construction site; and
- Consider alternative fuels and energy sources such as natural gas and electricity (plug-in or battery).

EPA29

Administrative Controls:

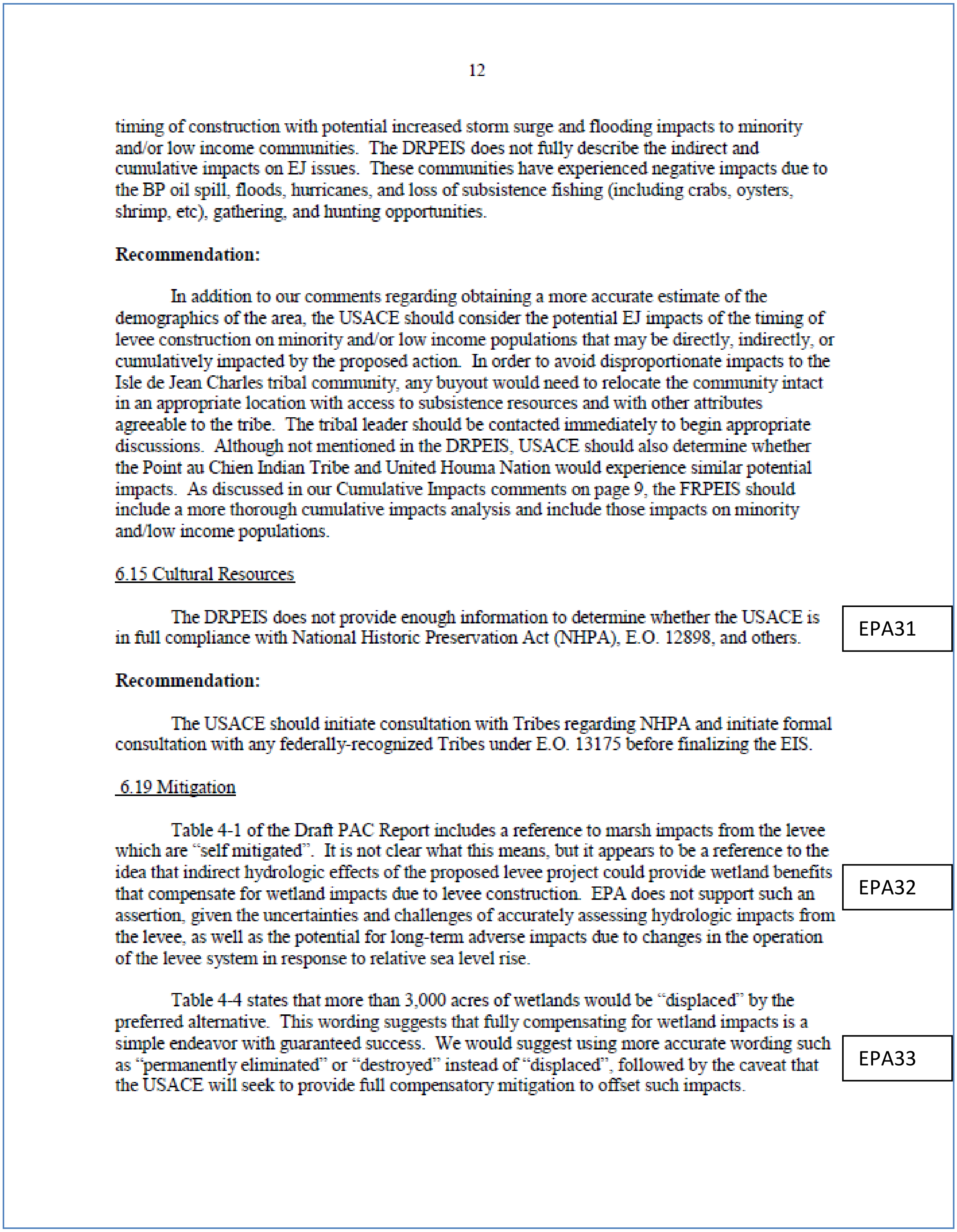
- Prepare an inventory of all equipment prior to construction and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking;
- Develop a construction traffic and parking management plan that maintains traffic flow and plan construction to minimize vehicle trips; and
- Identify sensitive receptors in the project area, such as children, elderly, and infirmed, and specify the means by which impacts to these populations will be minimized (e.g. locate construction equipment and staging zones away from sensitive receptors and building air intakes).

6.14.8 Environmental Justice, page 6-41

EPA30

Page 6-41 states "we have determined that there is no disproportionate impact to a minority or low income community."

EPA strongly disagrees with this statement. There is not adequate information in the DRPEIS to determine how the USACE came to the conclusion that there are no potentially disproportionate impacts to minority and/or low income communities. When one segment of the population benefits from the proposed action, but another absorbs the negative impacts of the action (i.e., increased storm surge and flooding as levee segments are constructed) in addition to historical actions/events (i.e. an already overburdened community), it can create a potentially disproportionate EJ impact. The USACE did not perform an adequate EJ assessment 1) comparing the potential impacts of those inside and outside the levees and 2) comparing the



timing of construction with potential increased storm surge and flooding impacts to minority and/or low income communities. The DRPEIS does not fully describe the indirect and cumulative impacts on EJ issues. These communities have experienced negative impacts due to the BP oil spill, floods, hurricanes, and loss of subsistence fishing (including crabs, oysters, shrimp, etc), gathering, and hunting opportunities.

Recommendation:

In addition to our comments regarding obtaining a more accurate estimate of the demographics of the area, the USACE should consider the potential EJ impacts of the timing of levee construction on minority and/or low income populations that may be directly, indirectly, or cumulatively impacted by the proposed action. In order to avoid disproportionate impacts to the Isle de Jean Charles tribal community, any buyout would need to relocate the community intact in an appropriate location with access to subsistence resources and with other attributes agreeable to the tribe. The tribal leader should be contacted immediately to begin appropriate discussions. Although not mentioned in the DRPEIS, USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts. As discussed in our Cumulative Impacts comments on page 9, the FRPEIS should include a more thorough cumulative impacts analysis and include those impacts on minority and/low income populations.

6.15 Cultural Resources

The DRPEIS does not provide enough information to determine whether the USACE is in full compliance with National Historic Preservation Act (NHPA), E.O. 12898, and others.

EPA31

Recommendation:

The USACE should initiate consultation with Tribes regarding NHPA and initiate formal consultation with any federally-recognized Tribes under E.O. 13175 before finalizing the EIS.

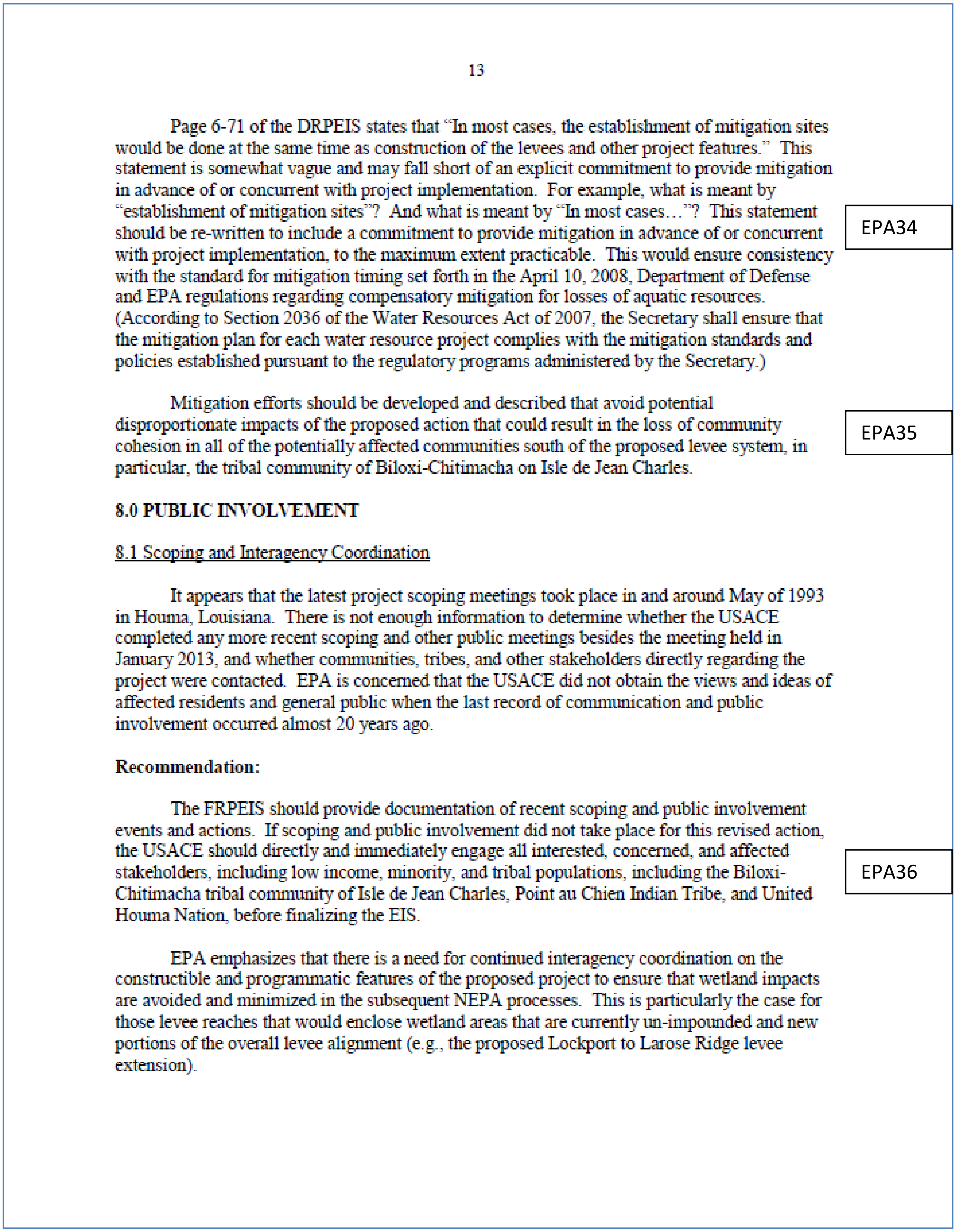
6.19 Mitigation

Table 4-1 of the Draft PAC Report includes a reference to marsh impacts from the levee which are "self mitigated". It is not clear what this means, but it appears to be a reference to the idea that indirect hydrologic effects of the proposed levee project could provide wetland benefits that compensate for wetland impacts due to levee construction. EPA does not support such an assertion, given the uncertainties and challenges of accurately assessing hydrologic impacts from the levee, as well as the potential for long-term adverse impacts due to changes in the operation of the levee system in response to relative sea level rise.

EPA32

Table 4-4 states that more than 3,000 acres of wetlands would be "displaced" by the preferred alternative. This wording suggests that fully compensating for wetland impacts is a simple endeavor with guaranteed success. We would suggest using more accurate wording such as "permanently eliminated" or "destroyed" instead of "displaced", followed by the caveat that the USACE will seek to provide full compensatory mitigation to offset such impacts.

EPA33



Page 6-71 of the DRPEIS states that "In most cases, the establishment of mitigation sites would be done at the same time as construction of the levees and other project features." This statement is somewhat vague and may fall short of an explicit commitment to provide mitigation in advance of or concurrent with project implementation. For example, what is meant by "establishment of mitigation sites"? And what is meant by "In most cases…"? This statement should be re-written to include a commitment to provide mitigation in advance of or concurrent with project implementation, to the maximum extent practicable. This would ensure consistency with the standard for mitigation timing set forth in the April 10, 2008, Department of Defense and EPA regulations regarding compensatory mitigation for losses of aquatic resources. (According to Section 2036 of the Water Resources Act of 2007, the Secretary shall ensure that the mitigation plan for each water resource project complies with the mitigation standards and policies established pursuant to the regulatory programs administered by the Secretary.)

EPA34

Mitigation efforts should be developed and described that avoid potential disproportionate impacts of the proposed action that could result in the loss of community cohesion in all of the potentially affected communities south of the proposed levee system, in particular, the tribal community of Biloxi-Chitimacha on Isle de Jean Charles.

EPA35

8.0 PUBLIC INVOLVEMENT

8.1 Scoping and Interagency Coordination

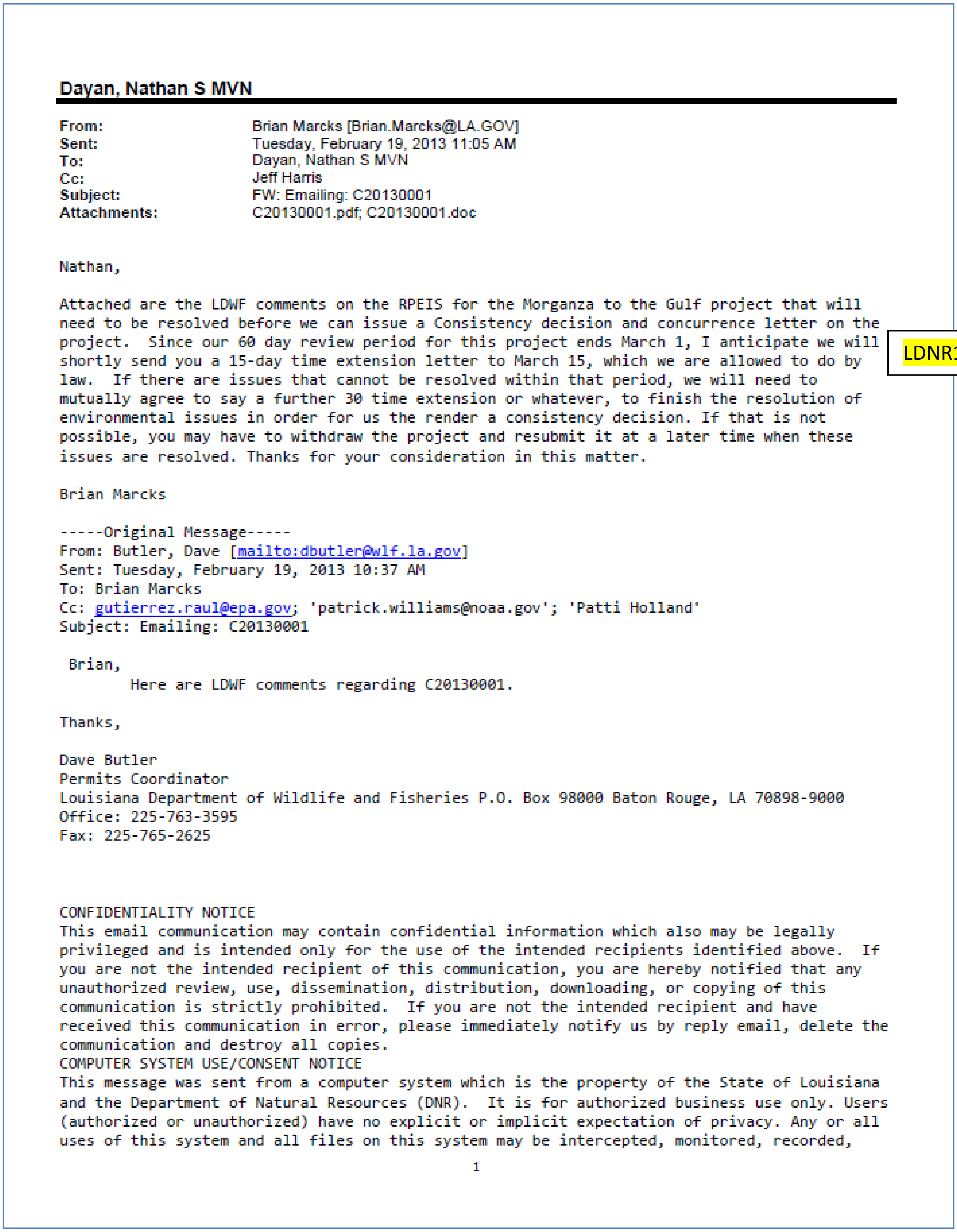
It appears that the latest project scoping meetings took place in and around May of 1993 in Houma, Louisiana. There is not enough information to determine whether the USACE completed any more recent scoping and other public meetings besides the meeting held in January 2013, and whether communities, tribes, and other stakeholders directly regarding the project were contacted. EPA is concerned that the USACE did not obtain the views and ideas of affected residents and general public when the last record of communication and public involvement occurred almost 20 years ago.

Recommendation:

The FRPEIS should provide documentation of recent scoping and public involvement events and actions. If scoping and public involvement did not take place for this revised action, the USACE should directly and immediately engage all interested, concerned, and affected stakeholders, including low income, minority, and tribal populations, including the Biloxi-Chitimacha tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation, before finalizing the EIS.

EPA36

EPA emphasizes that there is a need for continued interagency coordination on the constructible and programmatic features of the proposed project to ensure that wetland impacts are avoided and minimized in the subsequent NEPA processes. This is particularly the case for those levee reaches that would enclose wetland areas that are currently un-impounded and new portions of the overall levee alignment (e.g., the proposed Lockport to Larose Ridge levee extension).



Dayan, Nathan S MVN

From: Brian Marcks [Brian.Marcks@LA.GOV]
Sent: Tuesday, February 19, 2013 11:05 AM
To: Dayan, Nathan S MVN
Cc: Jeff Harris
Subject: FW: Emailing: C20130001
Attachments: C20130001.pdf; C20130001.doc

Nathan,

Attached are the LDWF comments on the RPEIS for the Morganza to the Gulf project that will need to be resolved before we can issue a Consistency decision and concurrence letter on the project. Since our 60 day review period for this project ends March 1, I anticipate we will shortly send you a 15-day time extension letter to March 15, which we are allowed to do by law. If there are issues that cannot be resolved within that period, we will need to mutually agree to say a further 30 time extension or whatever, to finish the resolution of environmental issues in order for us the render a consistency decision. If that is not possible, you may have to withdraw the project and resubmit it at a later time when these issues are resolved. Thanks for your consideration in this matter.

LDNR1?

Brian Marcks

-----Original Message-----
From: Butler, Dave [mailto:dbutler@wlf.la.gov]
Sent: Tuesday, February 19, 2013 10:37 AM
To: Brian Marcks
Cc: gutierrez.raul@epa.gov; 'patrick.williams@noaa.gov'; 'Patti Holland'
Subject: Emailing: C20130001

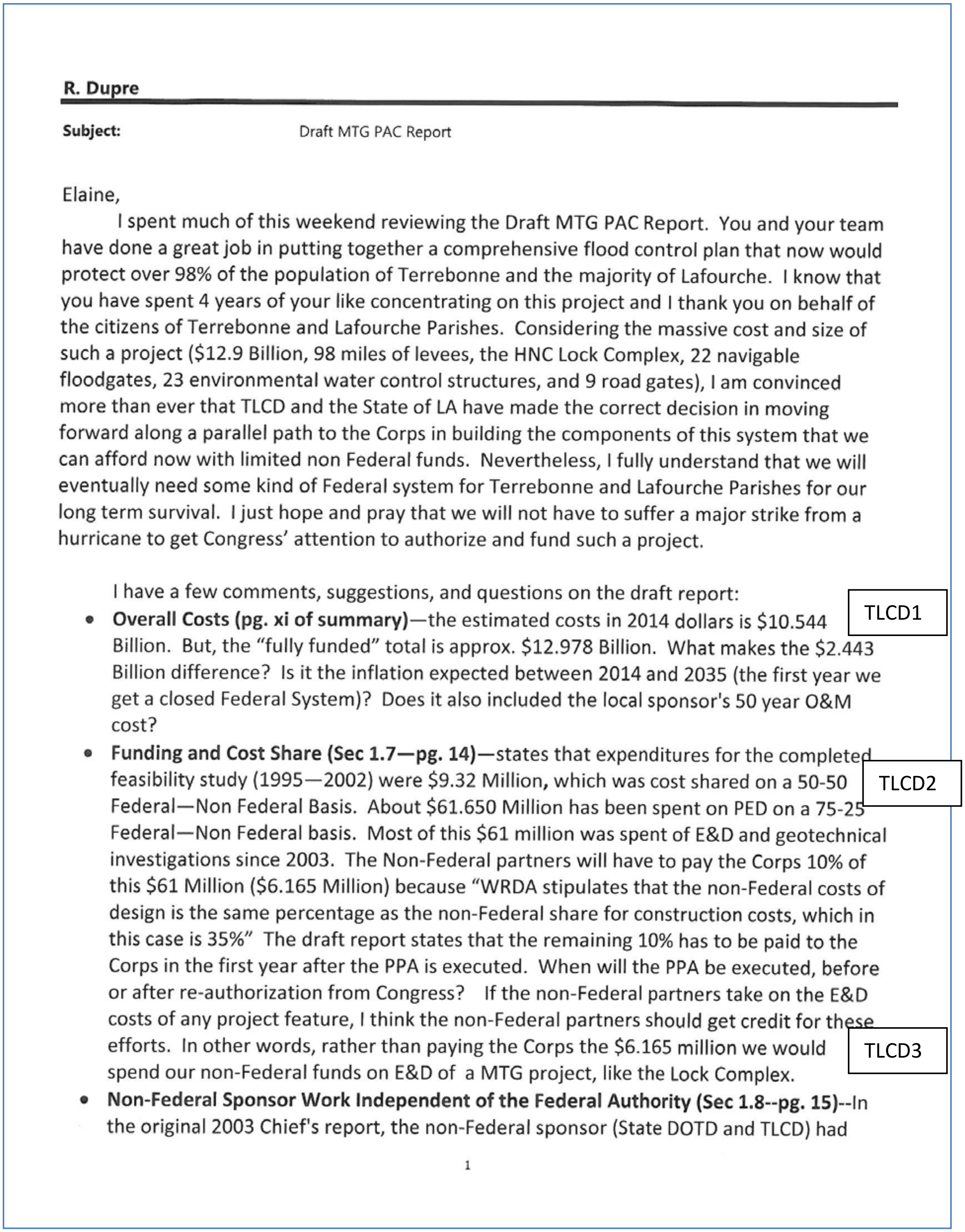
Brian,
Here are LDWF comments regarding C20130001.

Thanks,

Dave Butler
Permits Coordinator
Louisiana Department of Wildlife and Fisheries P.O. Box 98000 Baton Rouge, LA 70898-9000
Office: 225-763-3595
Fax: 225-765-2625

copied, audited, inspected, and disclosed to Department of Natural Resources and law enforcement personnel. By using this system the user consents to such interception, monitoring, recording, copying, auditing, inspection, and disclosure at the discretion of DNR.

2



R. Dupre

Subject: Draft MTG PAC Report

Elaine,

I spent much of this weekend reviewing the Draft MTG PAC Report. You and your team have done a great job in putting together a comprehensive flood control plan that now would protect over 98% of the population of Terrebonne and the majority of Lafourche. I know that you have spent 4 years of your like concentrating on this project and I thank you on behalf of the citizens of Terrebonne and Lafourche Parishes. Considering the massive cost and size of such a project ($12.9 Billion, 98 miles of levees, the HNC Lock Complex, 22 navigable floodgates, 23 environmental water control structures, and 9 road gates), I am convinced more than ever that TLCD and the State of LA have made the correct decision in moving forward along a parallel path to the Corps in building the components of this system that we can afford now with limited non Federal funds. Nevertheless, I fully understand that we will eventually need some kind of Federal system for Terrebonne and Lafourche Parishes for our long term survival. I just hope and pray that we will not have to suffer a major strike from a hurricane to get Congress' attention to authorize and fund such a project.

I have a few comments, suggestions, and questions on the draft report:

TLCD1

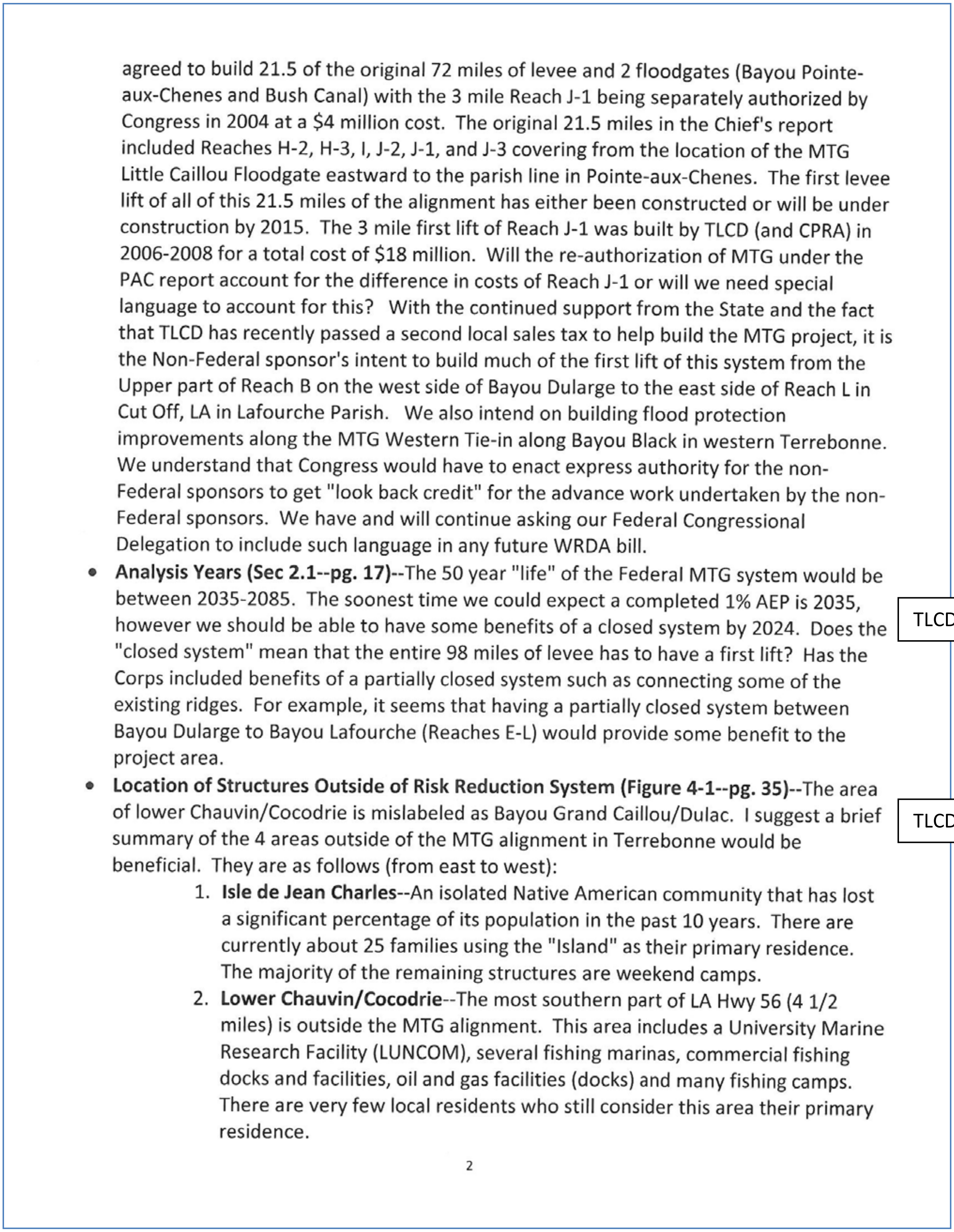
- **Overall Costs (pg. xi of summary)**—the estimated costs in 2014 dollars is $10.544 Billion. But, the "fully funded" total is approx. $12.978 Billion. What makes the $2.443 Billion difference? Is it the inflation expected between 2014 and 2035 (the first year we get a closed Federal System)? Does it also included the local sponsor's 50 year O&M cost?

TLCD2

- **Funding and Cost Share (Sec 1.7—pg. 14)**—states that expenditures for the completed feasibility study (1995—2002) were $9.32 Million**,** which was cost shared on a 50-50 Federal—Non Federal Basis. About $61.650 Million has been spent on PED on a 75-25 Federal—Non Federal basis. Most of this $61 million was spent of E&D and geotechnical investigations since 2003. The Non-Federal partners will have to pay the Corps 10% of this $61 Million ($6.165 Million) because "WRDA stipulates that the non-Federal costs of design is the same percentage as the non-Federal share for construction costs, which in this case is 35%" The draft report states that the remaining 10% has to be paid to the Corps in the first year after the PPA is executed. When will the PPA be executed, before or after re-authorization from Congress? If the non-Federal partners take on the E&D costs of any project feature, I think the non-Federal partners should get credit for these efforts. In other words, rather than paying the Corps the $6.165 million we would spend our non-Federal funds on E&D of a MTG project, like the Lock Complex.

TLCD3

- **Non-Federal Sponsor Work Independent of the Federal Authority (Sec 1.8--pg. 15)**--In the original 2003 Chief's report, the non-Federal sponsor (State DOTD and TLCD) had



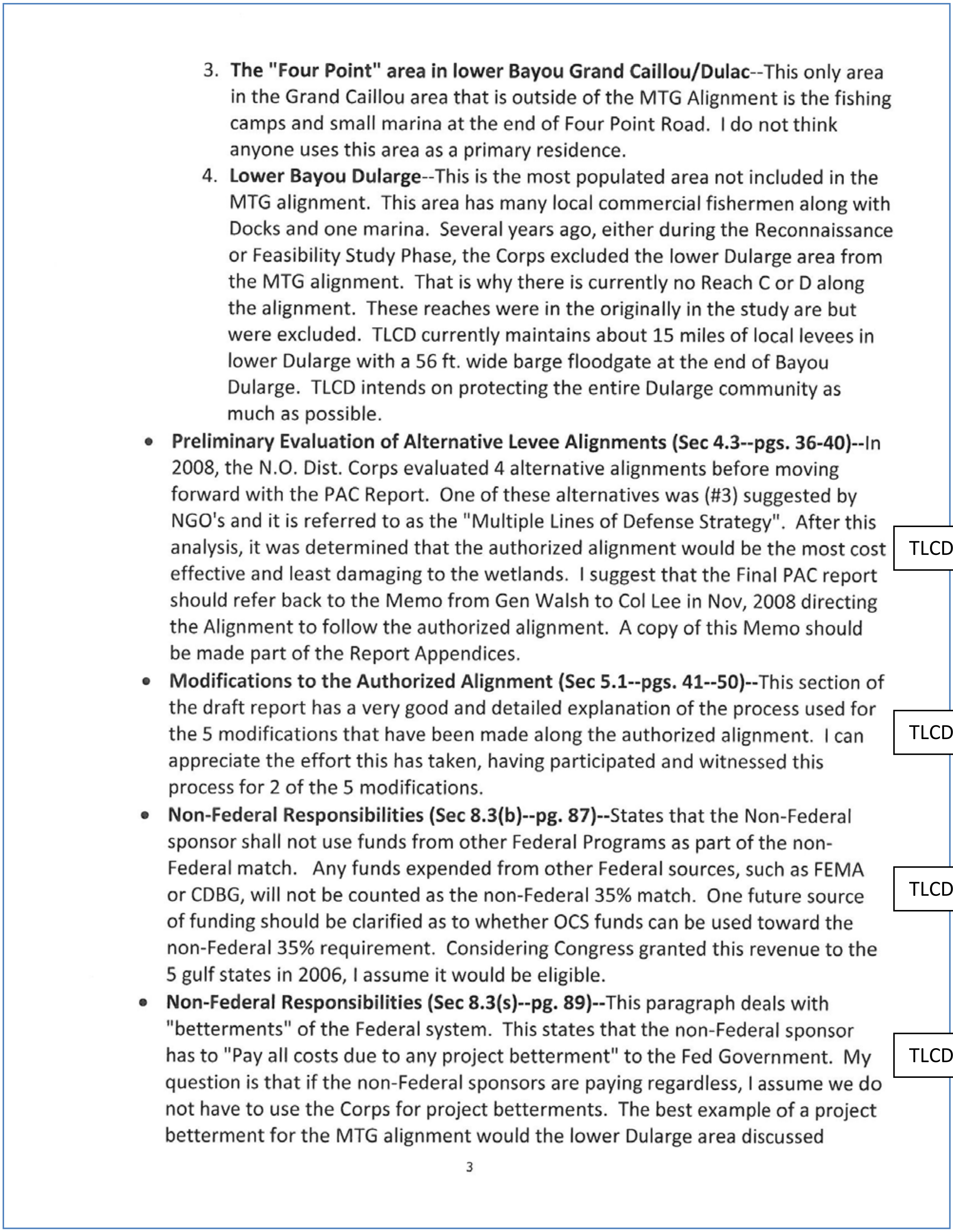
agreed to build 21.5 of the original 72 miles of levee and 2 floodgates (Bayou Pointe-aux-Chenes and Bush Canal) with the 3 mile Reach J-1 being separately authorized by Congress in 2004 at a $4 million cost. The original 21.5 miles in the Chief's report included Reaches H-2, H-3, I, J-2, J-1, and J-3 covering from the location of the MTG Little Caillou Floodgate eastward to the parish line in Pointe-aux-Chenes. The first levee lift of all of this 21.5 miles of the alignment has either been constructed or will be under construction by 2015. The 3 mile first lift of Reach J-1 was built by TLCD (and CPRA) in 2006-2008 for a total cost of $18 million. Will the re-authorization of MTG under the PAC report account for the difference in costs of Reach J-1 or will we need special language to account for this? With the continued support from the State and the fact that TLCD has recently passed a second local sales tax to help build the MTG project, it is the Non-Federal sponsor's intent to build much of the first lift of this system from the Upper part of Reach B on the west side of Bayou Dularge to the east side of Reach L in Cut Off, LA in Lafourche Parish. We also intend on building flood protection improvements along the MTG Western Tie-in along Bayou Black in western Terrebonne. We understand that Congress would have to enact express authority for the non-Federal sponsors to get "look back credit" for the advance work undertaken by the non-Federal sponsors. We have and will continue asking our Federal Congressional Delegation to include such language in any future WRDA bill.

- **Analysis Years (Sec 2.1--pg. 17)--**The 50 year "life" of the Federal MTG system would be between 2035-2085. The soonest time we could expect a completed 1% AEP is 2035, however we should be able to have some benefits of a closed system by 2024. Does the "closed system" mean that the entire 98 miles of levee has to have a first lift? Has the Corps included benefits of a partially closed system such as connecting some of the existing ridges. For example, it seems that having a partially closed system between Bayou Dularge to Bayou Lafourche (Reaches E-L) would provide some benefit to the project area.

TLCD4

- **Location of Structures Outside of Risk Reduction System (Figure 4-1--pg. 35)--**The area of lower Chauvin/Cocodrie is mislabeled as Bayou Grand Caillou/Dulac. I suggest a brief summary of the 4 areas outside of the MTG alignment in Terrebonne would be beneficial. They are as follows (from east to west):
    1. **Isle de Jean Charles--**An isolated Native American community that has lost a significant percentage of its population in the past 10 years. There are currently about 25 families using the "Island" as their primary residence. The majority of the remaining structures are weekend camps.
    2. **Lower Chauvin/Cocodrie**--The most southern part of LA Hwy 56 (4 1/2 miles) is outside the MTG alignment. This area includes a University Marine Research Facility (LUNCOM), several fishing marinas, commercial fishing docks and facilities, oil and gas facilities (docks) and many fishing camps. There are very few local residents who still consider this area their primary residence.

TLCD5



3. **The "Four Point" area in lower Bayou Grand Caillou/Dulac**--This only area in the Grand Caillou area that is outside of the MTG Alignment is the fishing camps and small marina at the end of Four Point Road. I do not think anyone uses this area as a primary residence.
4. **Lower Bayou Dularge**--This is the most populated area not included in the MTG alignment. This area has many local commercial fishermen along with Docks and one marina. Several years ago, either during the Reconnaissance or Feasibility Study Phase, the Corps excluded the lower Dularge area from the MTG alignment. That is why there is currently no Reach C or D along the alignment. These reaches were in the originally in the study are but were excluded. TLCD currently maintains about 15 miles of local levees in lower Dularge with a 56 ft. wide barge floodgate at the end of Bayou Dularge. TLCD intends on protecting the entire Dularge community as much as possible.

- **Preliminary Evaluation of Alternative Levee Alignments (Sec 4.3--pgs. 36-40)--**In 2008, the N.O. Dist. Corps evaluated 4 alternative alignments before moving forward with the PAC Report. One of these alternatives was (#3) suggested by NGO's and it is referred to as the "Multiple Lines of Defense Strategy". After this analysis, it was determined that the authorized alignment would be the most cost effective and least damaging to the wetlands. I suggest that the Final PAC report should refer back to the Memo from Gen Walsh to Col Lee in Nov, 2008 directing the Alignment to follow the authorized alignment. A copy of this Memo should be made part of the Report Appendices.

TLCD6

- **Modifications to the Authorized Alignment (Sec 5.1--pgs. 41--50)--**This section of the draft report has a very good and detailed explanation of the process used for the 5 modifications that have been made along the authorized alignment. I can appreciate the effort this has taken, having participated and witnessed this process for 2 of the 5 modifications.

TLCD7

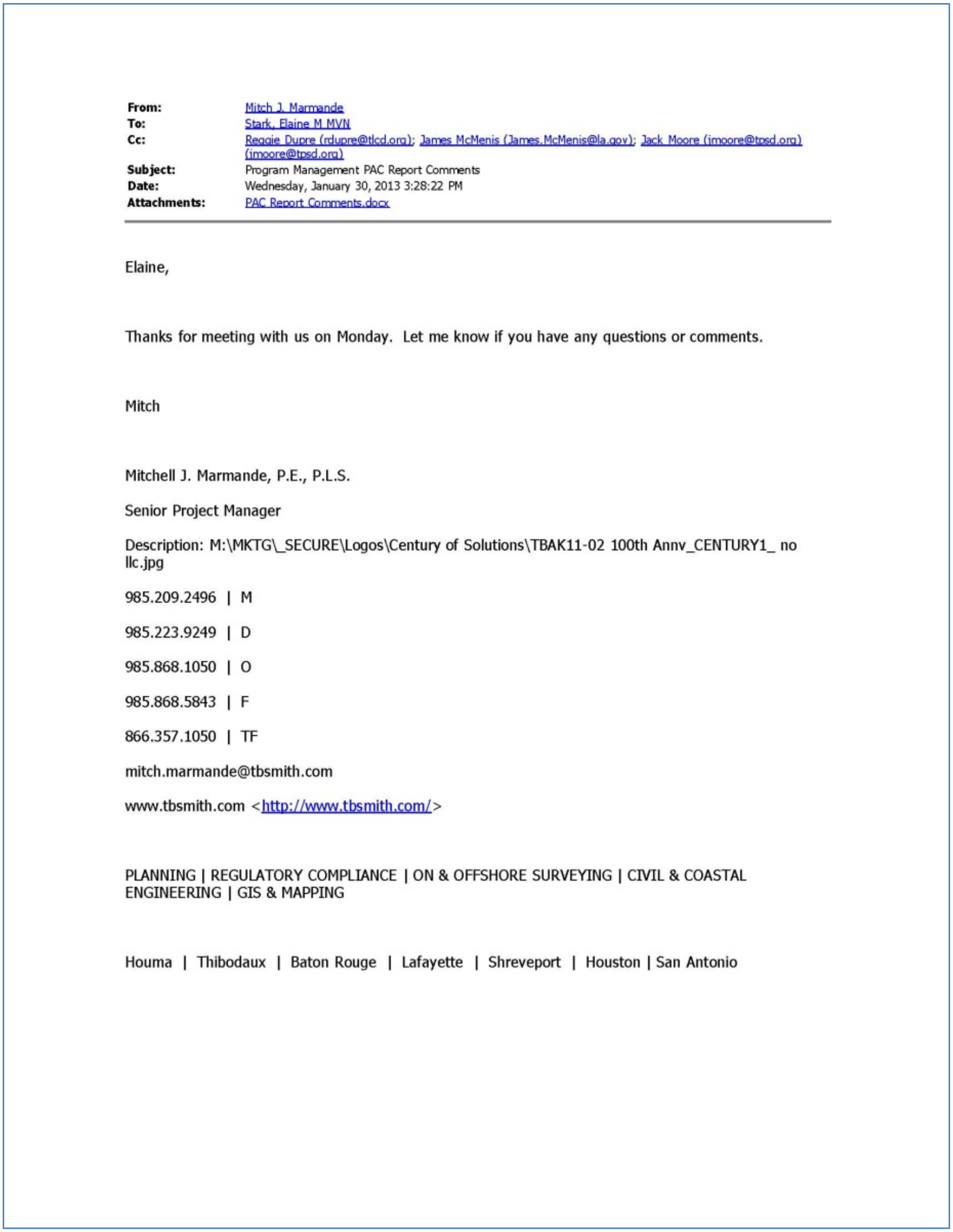
- **Non-Federal Responsibilities (Sec 8.3(b)--pg. 87)--**States that the Non-Federal sponsor shall not use funds from other Federal Programs as part of the non-Federal match. Any funds expended from other Federal sources, such as FEMA or CDBG, will not be counted as the non-Federal 35% match. One future source of funding should be clarified as to whether OCS funds can be used toward the non-Federal 35% requirement. Considering Congress granted this revenue to the 5 gulf states in 2006, I assume it would be eligible.

TLCD8

- **Non-Federal Responsibilities (Sec 8.3(s)--pg. 89)--**This paragraph deals with "betterments" of the Federal system. This states that the non-Federal sponsor has to "Pay all costs due to any project betterment" to the Fed Government. My question is that if the non-Federal sponsors are paying regardless, I assume we do not have to use the Corps for project betterments. The best example of a project betterment for the MTG alignment would the lower Dularge area discussed

TLCD9

above. I think we, as non-Federal sponsors, would want to handle all these efforts on our own.



From: Mitch J. Marmande
To: Stark, Elaine M MVN
Cc: Reggie Dupre (rdupre@tlcd.org); James McMenis (James.McMenis@la.gov); Jack Moore (jmoore@tpsd.org) (jmoore@tpsd.org)
Subject: Program Management PAC Report Comments
Date: Wednesday, January 30, 2013 3:28:22 PM
Attachments: PAC Report Comments.docx

Elaine,

Thanks for meeting with us on Monday. Let me know if you have any questions or comments.

Mitch

Mitchell J. Marmande, P.E., P.L.S.

Senior Project Manager

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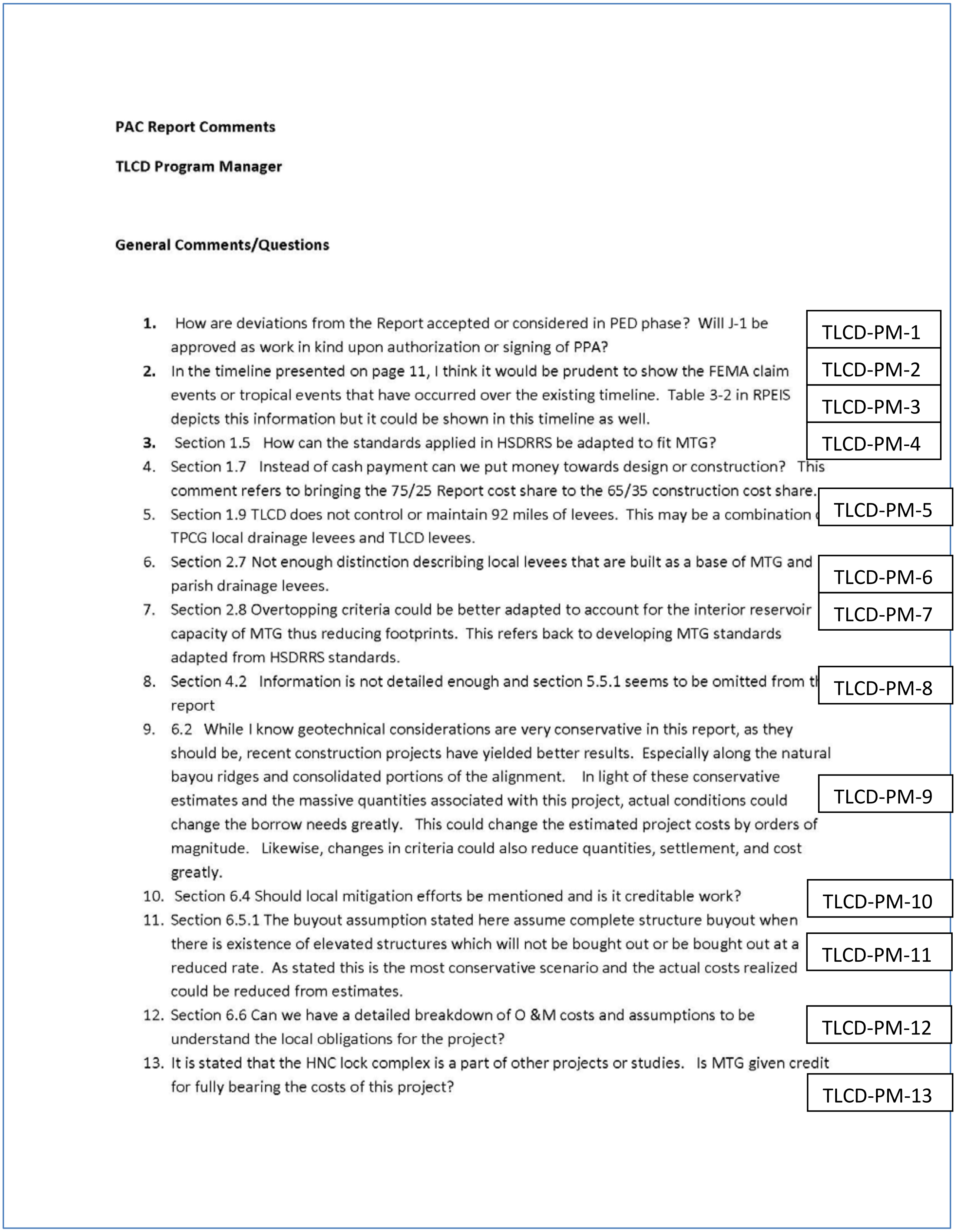


PAC Report Comments

TLCD Program Manager

General Comments/Questions

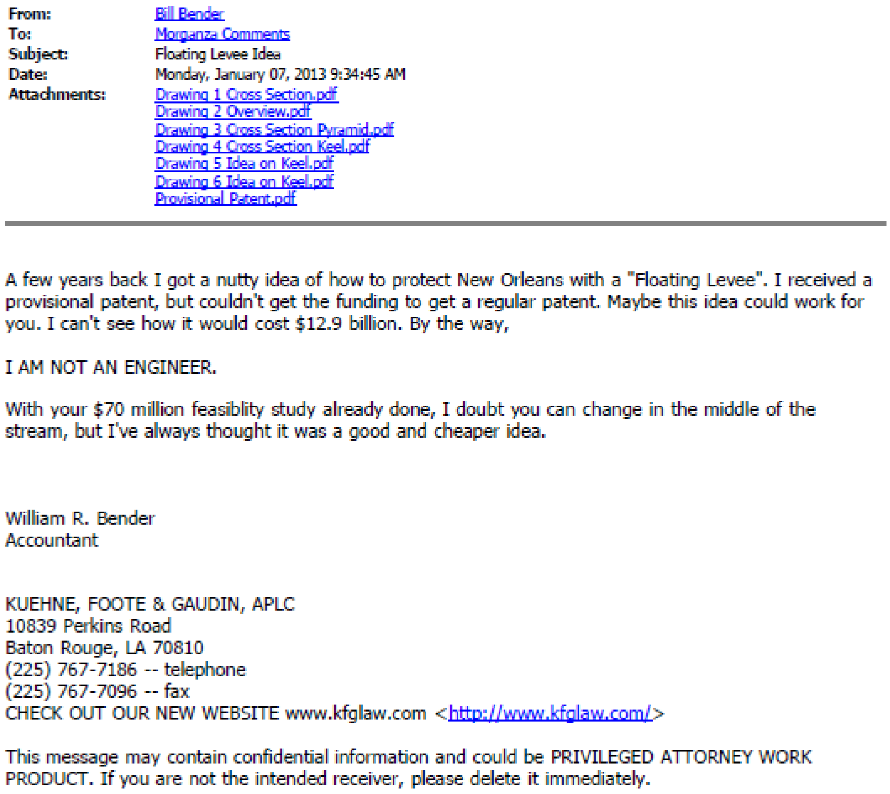
1. How are deviations from the Report accepted or considered in PED phase? Will J-1 be approved as work in kind upon authorization or signing of PPA? TLCD-PM-1
2. In the timeline presented on page 11, I think it would be prudent to show the FEMA claim events or tropical events that have occurred over the existing timeline. Table 3-2 in RPEIS depicts this information but it could be shown in this timeline as well. TLCD-PM-2 TLCD-PM-3
3. Section 1.5 How can the standards applied in HSDRRS be adapted to fit MTG? TLCD-PM-4
4. Section 1.7 Instead of cash payment can we put money towards design or construction? This comment refers to bringing the 75/25 Report cost share to the 65/35 construction cost share.
5. Section 1.9 TLCD does not control or maintain 92 miles of levees. This may be a combination TPCG local drainage levees and TLCD levees. TLCD-PM-5
6. Section 2.7 Not enough distinction describing local levees that are built as a base of MTG and parish drainage levees. TLCD-PM-6
7. Section 2.8 Overtopping criteria could be better adapted to account for the interior reservoir capacity of MTG thus reducing footprints. This refers back to developing MTG standards adapted from HSDRRS standards. TLCD-PM-7
8. Section 4.2 Information is not detailed enough and section 5.5.1 seems to be omitted from t report TLCD-PM-8
9. 6.2 While I know geotechnical considerations are very conservative in this report, as they should be, recent construction projects have yielded better results. Especially along the natural bayou ridges and consolidated portions of the alignment. In light of these conservative estimates and the massive quantities associated with this project, actual conditions could change the borrow needs greatly. This could change the estimated project costs by orders of magnitude. Likewise, changes in criteria could also reduce quantities, settlement, and cost greatly. TLCD-PM-9
10. Section 6.4 Should local mitigation efforts be mentioned and is it creditable work? TLCD-PM-10
11. Section 6.5.1 The buyout assumption stated here assume complete structure buyout when there is existence of elevated structures which will not be bought out or be bought out at a reduced rate. As stated this is the most conservative scenario and the actual costs realized could be reduced from estimates. TLCD-PM-11
12. Section 6.6 Can we have a detailed breakdown of O &M costs and assumptions to be understand the local obligations for the project? TLCD-PM-12
13. It is stated that the HNC lock complex is a part of other projects or studies. Is MTG given credit for fully bearing the costs of this project? TLCD-PM-13

14. The incorporation of relative sea level rise add material, mitigation to the MTG project. Should the estimated levels be lower levees may not need to be lifted to the final design elevations. Structures would however be designed at these conservative heights. The intermediate seal level assumption is chosen for MTG but it seems that low level assumption would be acceptable for the same reason the intermediate level was chosen. Please provide more detail. As stated this could change the overall costs of the project by 99 million dollars. TLCD-PM-14
15. Section 7.3.2 Will environmental structures be built to final design elevations and what sequence will they be constructed as they relate to the reaches they are contained in. TLCD-PM-15
16. Average haul distances can be greatly reduced (25 miles one way) thus changing the construction costs for these projects greatly. TLCD-PM-16
17. Non Federal Responsibilities in this report are listed in several pages in this report while federal obligations are listed only in several sentences. This would not seem to reflect the 65/35 federal/non federal cost share. TLCD-PM-17
18. Please clarify the differences between fully funded MTG and FY14 costs. TLCD-PM-18

RPEIS Comments/Questions

1. Section 3.7.2 Would the implementation of MTG reduce the amount of converted open water areas? TLCD-PM-19
2. Lake Boudreaux Freshwater Introduction does not seem to appear in the list of CWPPRA Projects TLCD-PM-20
3. Section 5.1 Would it be pertinent to list the things that have greatly affected the environmental setting of this area such as closure of Bayou Lafourche in 1903, the construction of channels, canals, roads and oilfield activity? These are mentioned in the Section 5.2.10 and also in Section 6.2 but I think it is important to note that all of these things make up the environmental setting in addition to the fact that the basin is a freshwater/sediment starved system. TLCD-PM-21

Public Comments



From: Bill Bender
To: Morganza Comments
Subject: Floating Levee Idea
Date: Monday, January 07, 2013 9:34:45 AM
Attachments: Drawing 1 Cross Section.pdf
Drawing 2 Overview.pdf
Drawing 3 Cross Section Pyramid.pdf
Drawing 4 Cross Section Keel.pdf
Drawing 5 Idea on Keel.pdf
Drawing 6 Idea on Keel.pdf
Provisional Patent.pdf

A few years back I got a nutty idea of how to protect New Orleans with a "Floating Levee". I received a provisional patent, but couldn't get the funding to get a regular patent. Maybe this idea could work for you. I can't see how it would cost $12.9 billion. By the way,

I AM NOT AN ENGINEER.

With your $70 million feasiblity study already done, I doubt you can change in the middle of the stream, but I've always thought it was a good and cheaper idea.

William R. Bender
Accountant

KUEHNE, FOOTE & GAUDIN, APLC
10839 Perkins Road
Baton Rouge, LA 70810
(225) 767-7186 -- telephone
(225) 767-7096 -- fax
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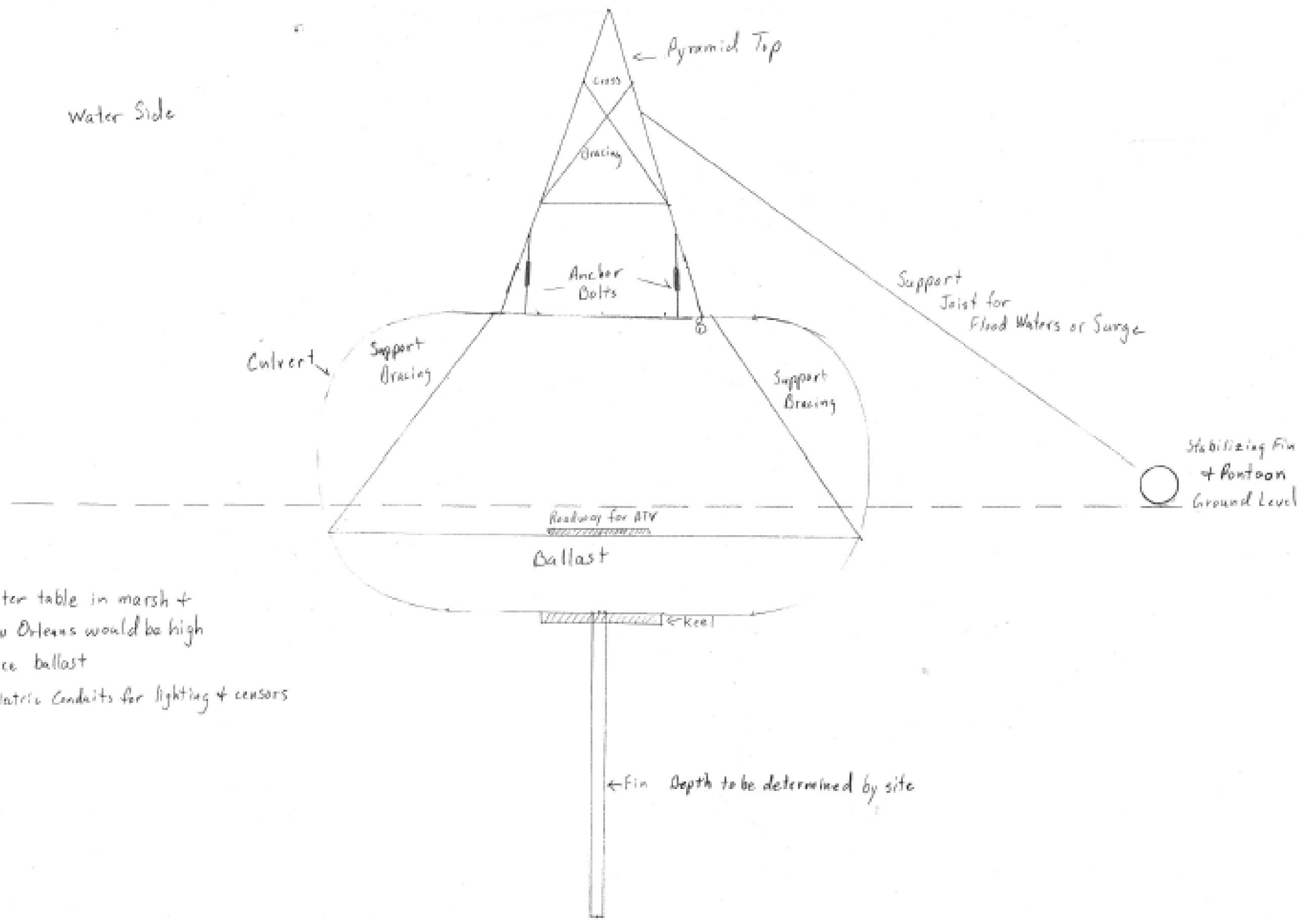
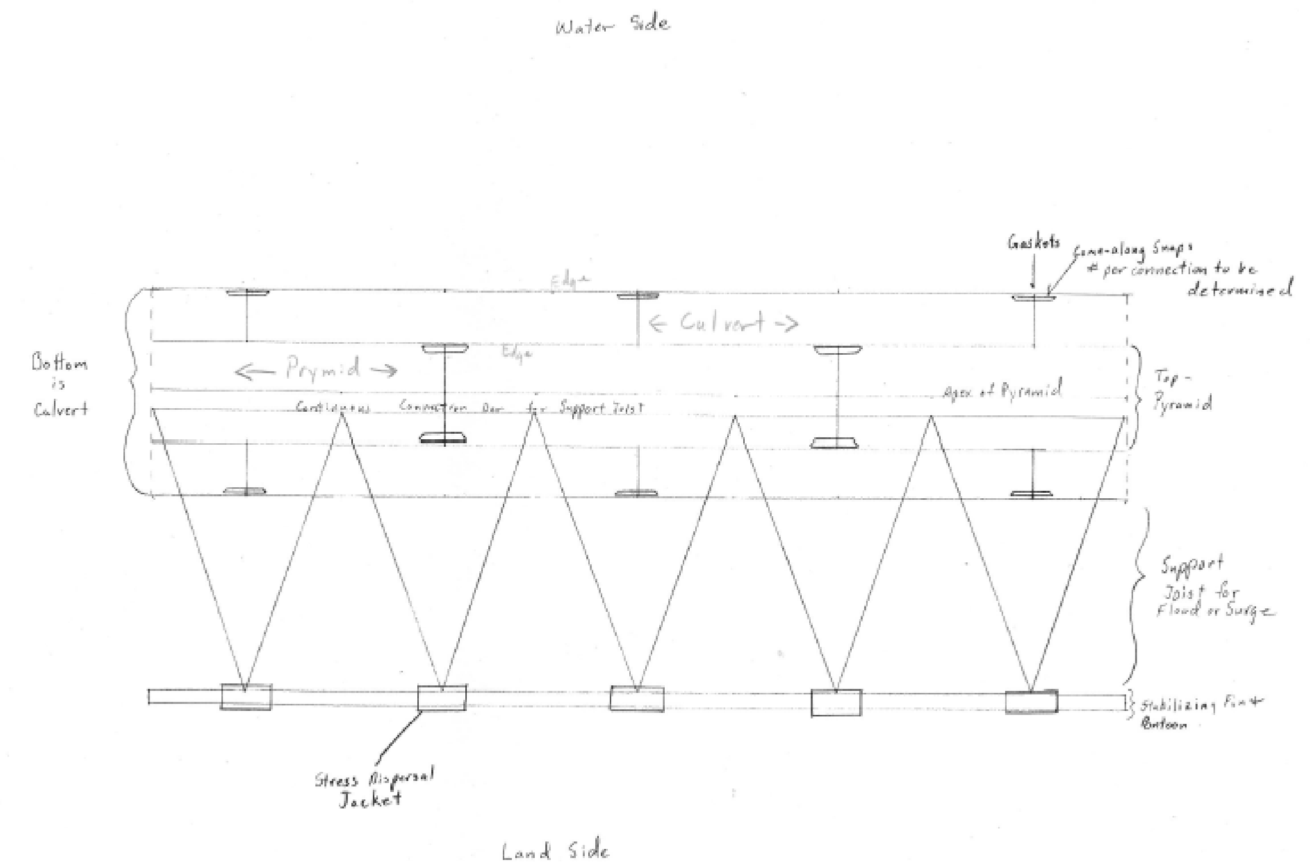
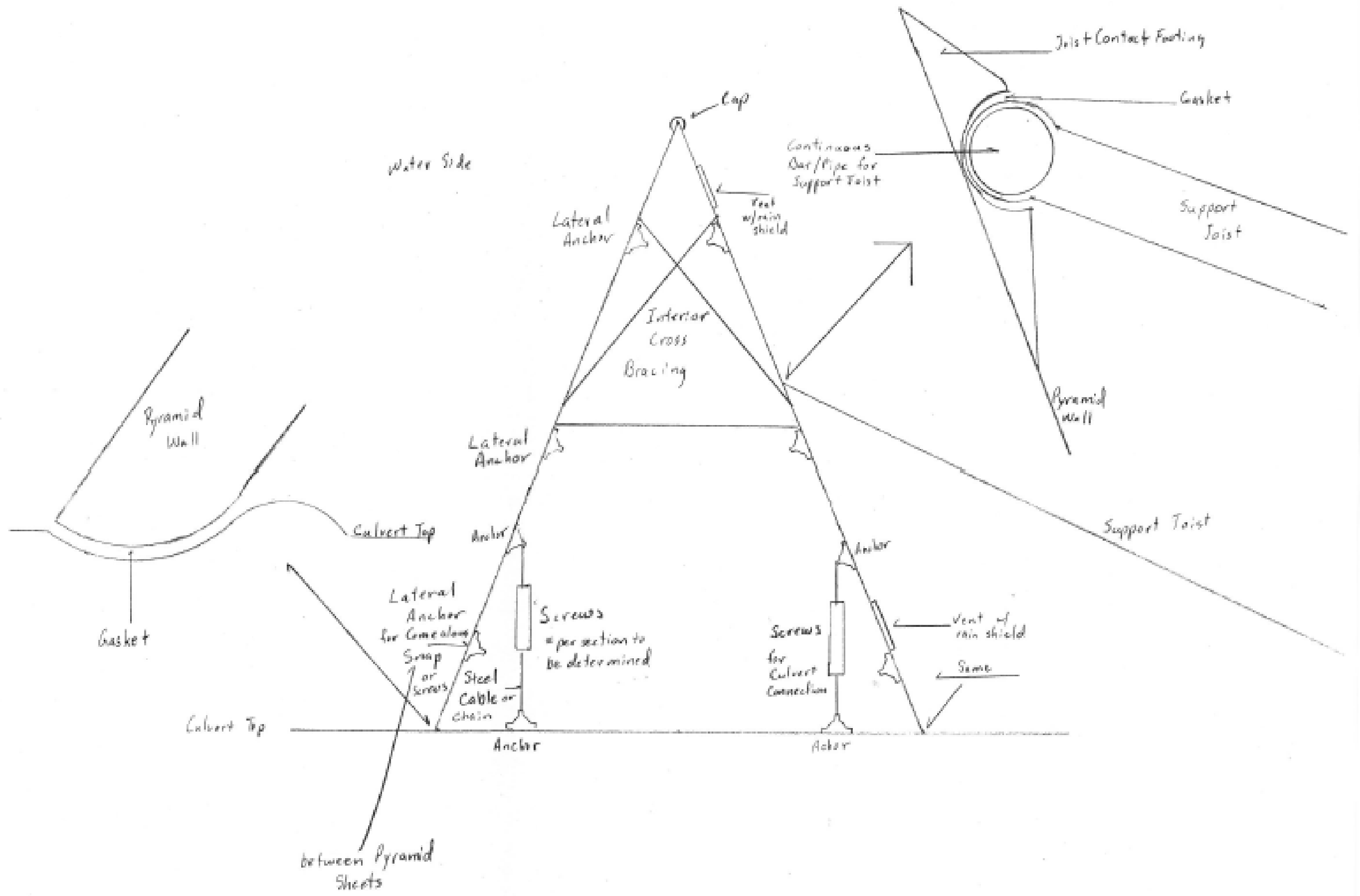
BEND1

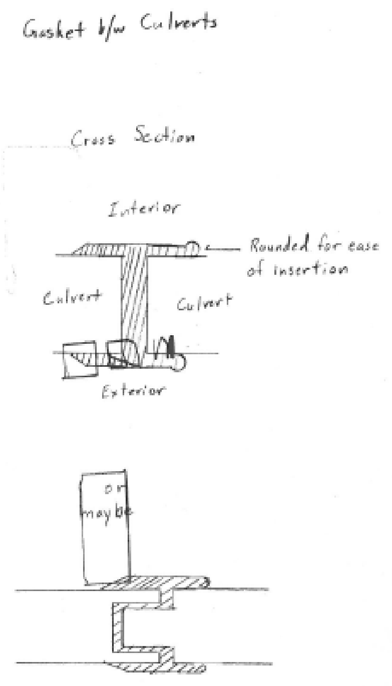
Culvert Style Levee

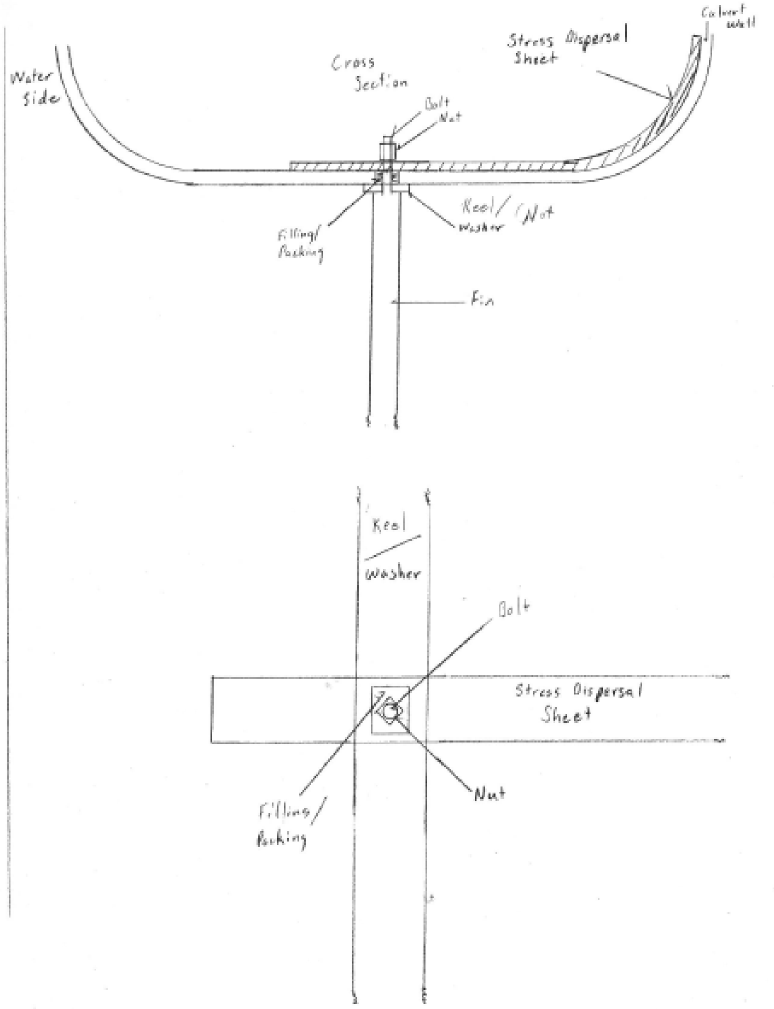


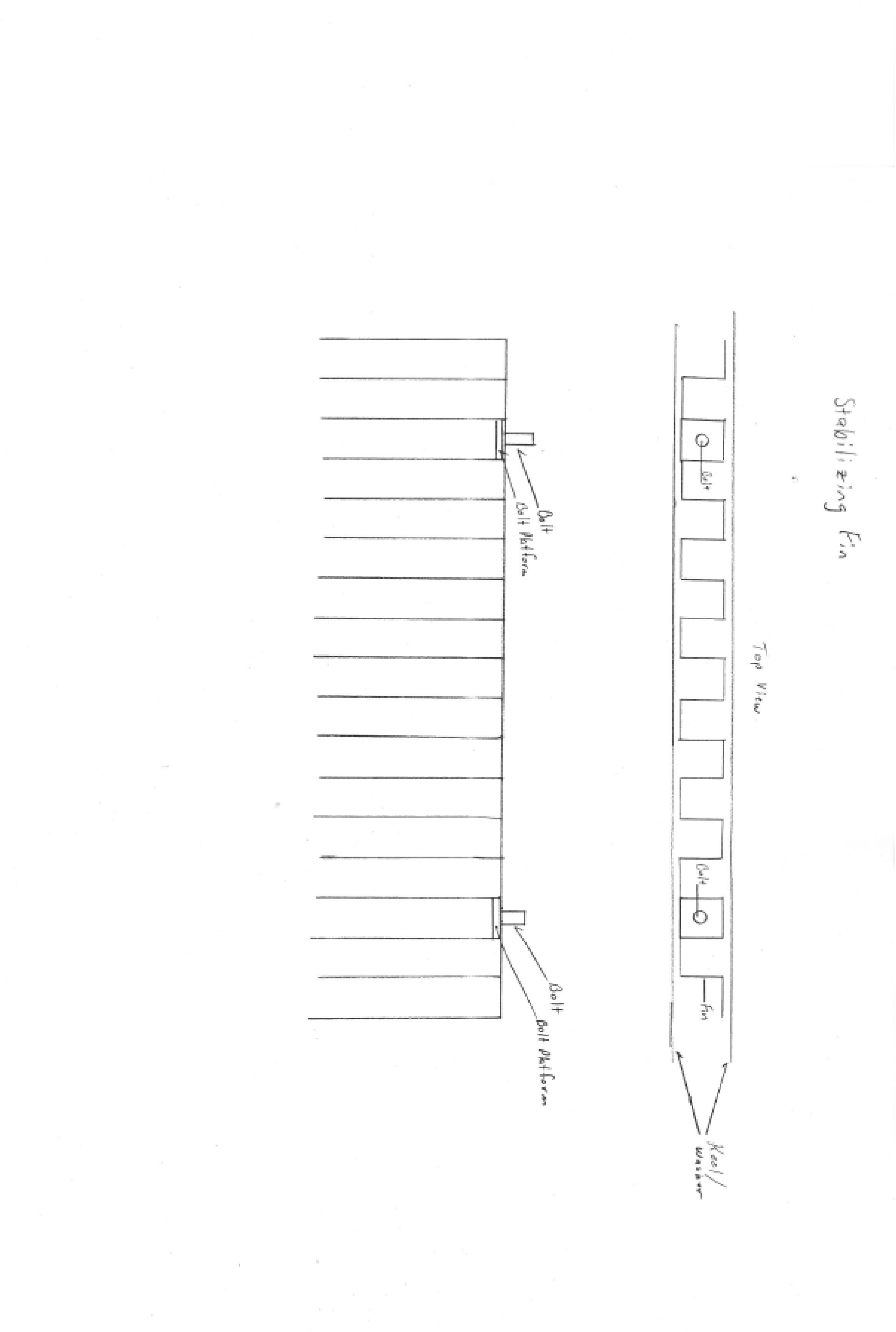
Water table in marsh +
New Orleans would be high
Hence ballast
① Elctric Conduits for lighting + censors

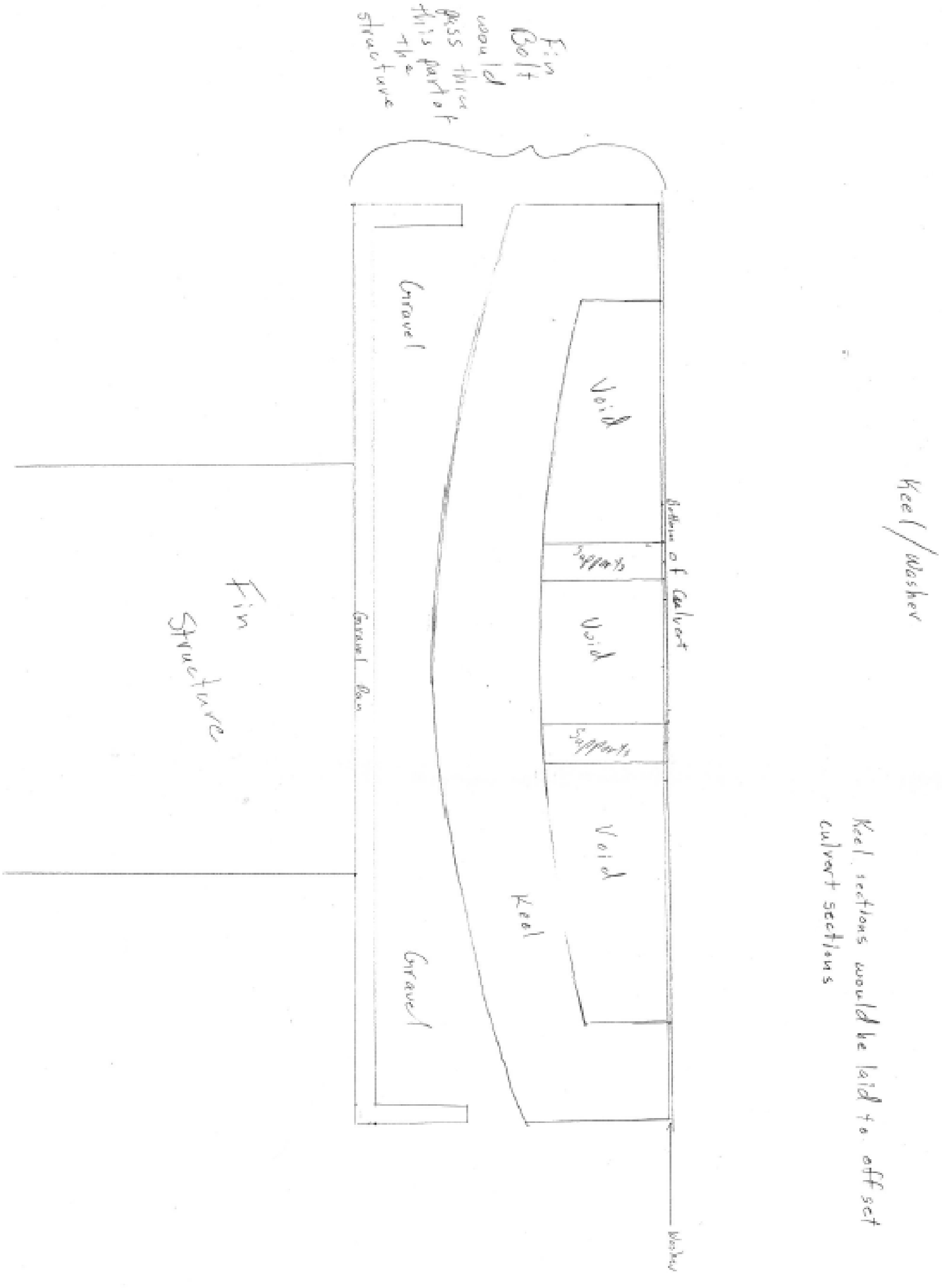

Water Side
Gaskets
Come-along Snaps
per connection to be determined
Edge
← Calvert →
Edge
Bottom is Calvert
← Prymid →
Apex of Pyramid
Top - Pyramid
Continuous Connection Bar for Support Joist
Support Joist for Flood or Surge
Stabilizing Float Pontoon
Stress Dispersal Jacket
Land Side

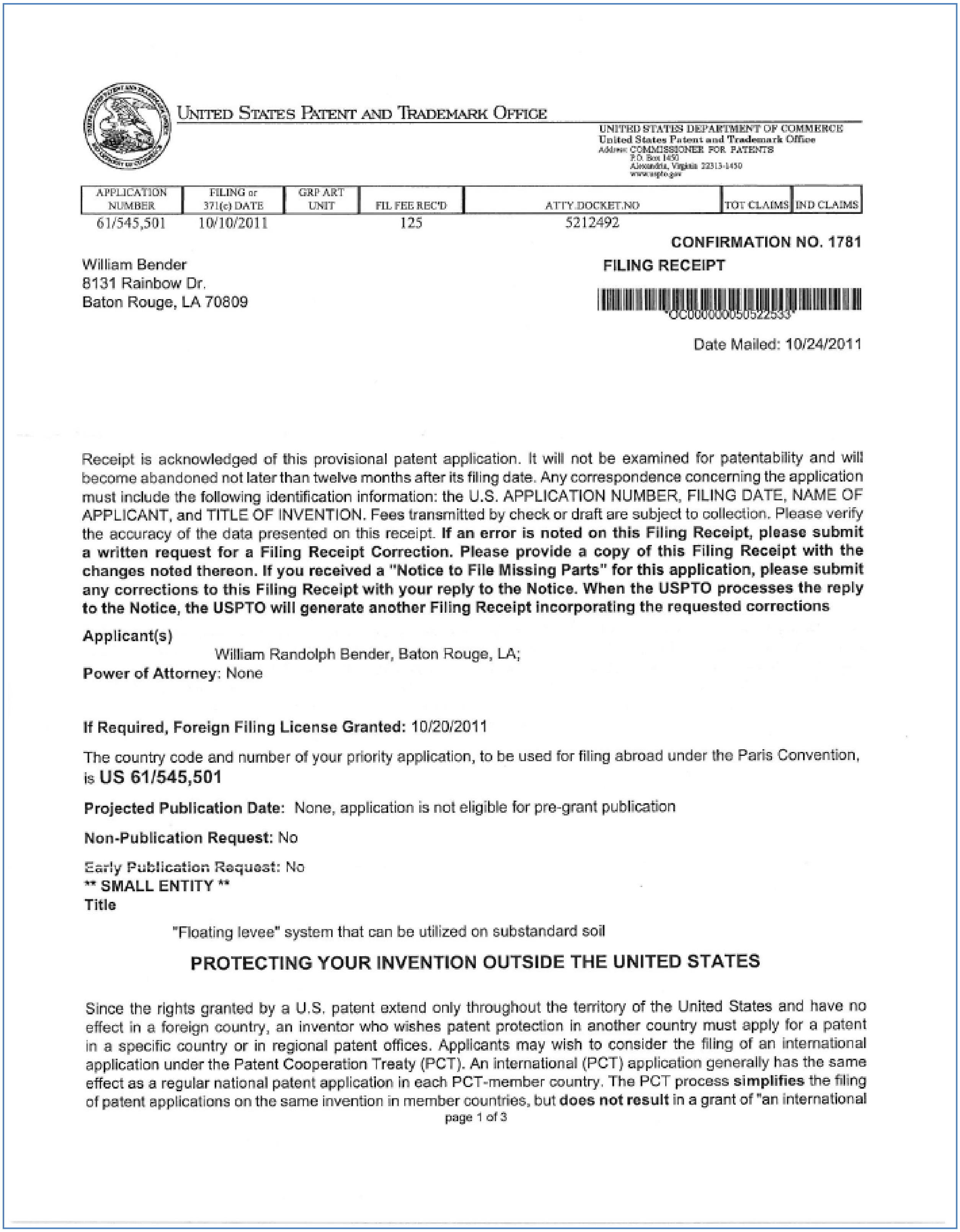

Cap
Joist Contact Footing
Gasket
Continuous Bar/Pipe for Support Joist
Water Side
Vent w/rain shield
Lateral Anchor
Support Joist
Interior Cross Bracing
Pyramid Wall
Pyramid Wall
Lateral Anchor
Support Joist
Culvert Top
Anchor
Anchor
Lateral Anchor for Comealong
Screws
= per section to be determined
Screws for Culvert Connection
Vent w/ rain shield
Gasket
Snap or Screws
Steel Cable or chain
Same
Culvert Top
Anchor
Acbor
between Pyramid Sheets


Gasket b/w Culverts
Cross Section
Interior
Rounded for ease of insertion
Culvert
Culvert
Exterior
or maybe


Water side
Cross Section
Bolt
Nut
Stress Dispersal Sheet
Culvert wall
Filling/ Packing
Keel/ Washer
Nut
Fin
Keel
Washer
Bolt
Stress Dispersal Sheet
Nut
Filling/ Packing


Stabilizing Fin
Top View
Bolt
Bolt
Fin
Keel/Washer
Bolt
Bolt Platform
Bolt
Bolt Platform


Fin Bolt would pass thru this part of the structure
Gravel
Void
Supports
Void
Supports
Void
Keel
Gravel
Bottom of Culvert
Gravel Pan
Fin Structure
Keel / Washer
Keel sections would be laid to off set culvert sections
Washer



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
61/545,501	10/10/2011		125	5212492		

CONFIRMATION NO. 1781

William Bender
8131 Rainbow Dr.
Baton Rouge, LA 70809

FILING RECEIPT

OC000000050522533

Date Mailed: 10/24/2011

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

William Randolph Bender, Baton Rouge, LA;

Power of Attorney: None

If Required, Foreign Filing License Granted: 10/20/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/545,501**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

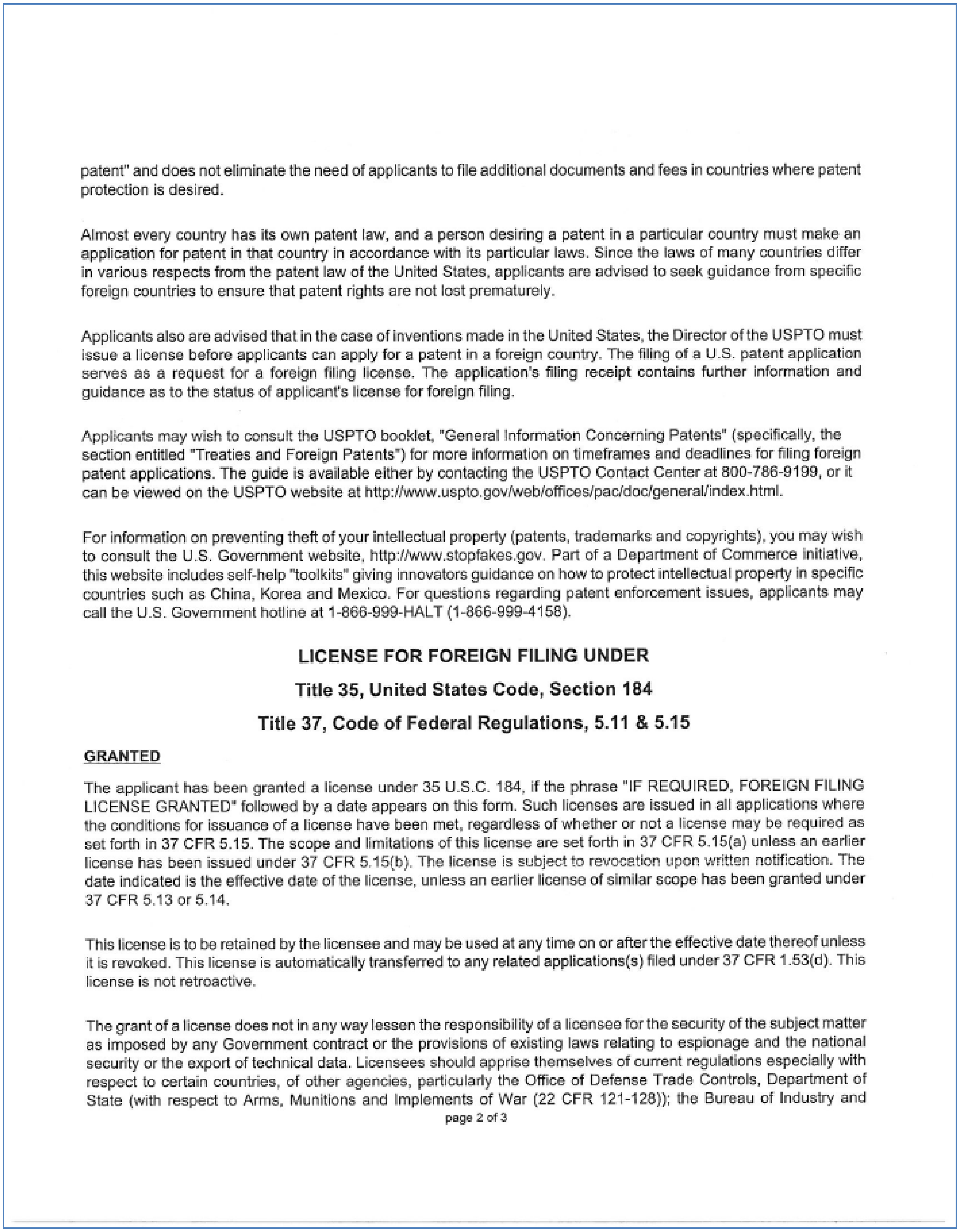
Title

"Floating levee" system that can be utilized on substandard soil

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international

page 1 of 3



patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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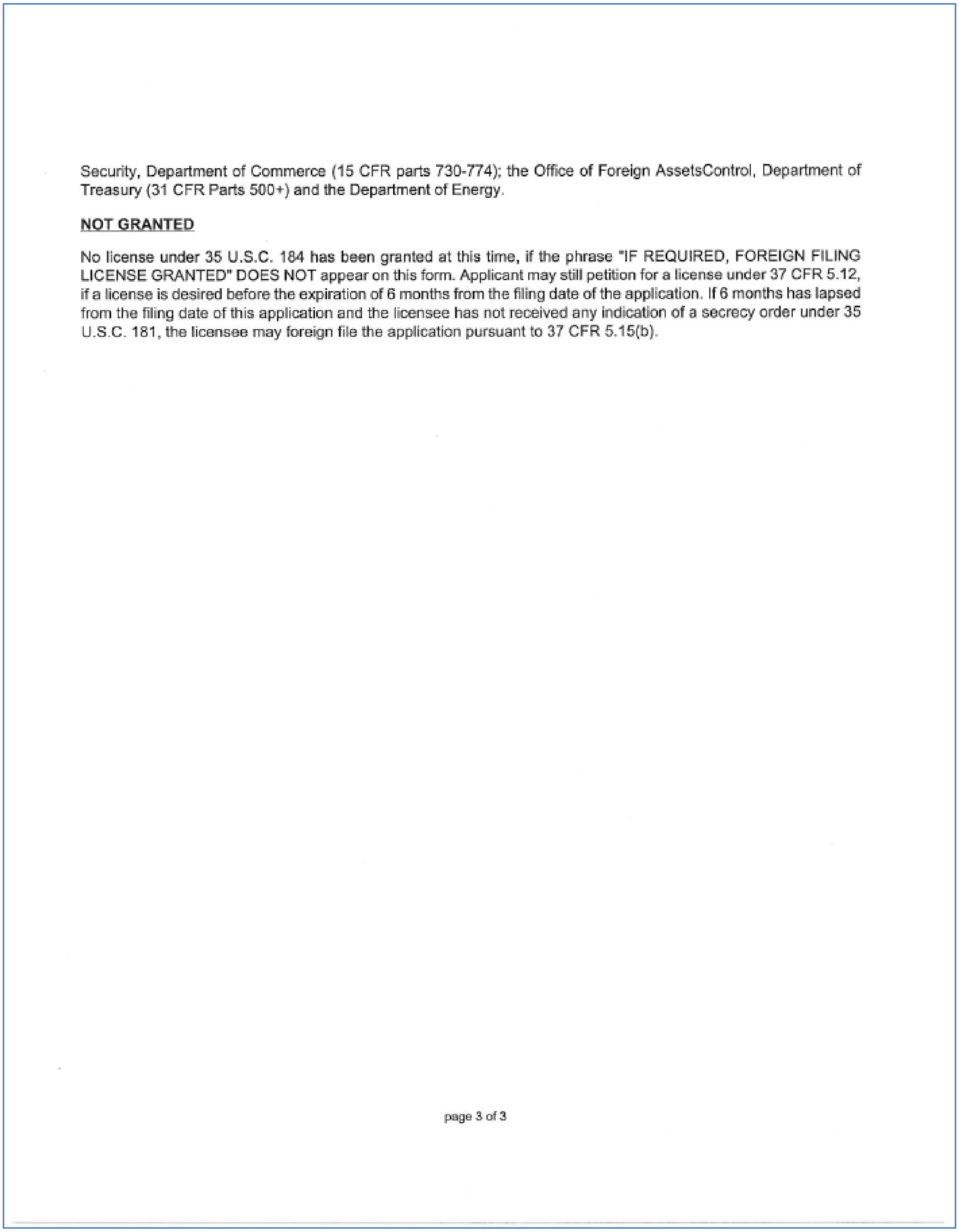

Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

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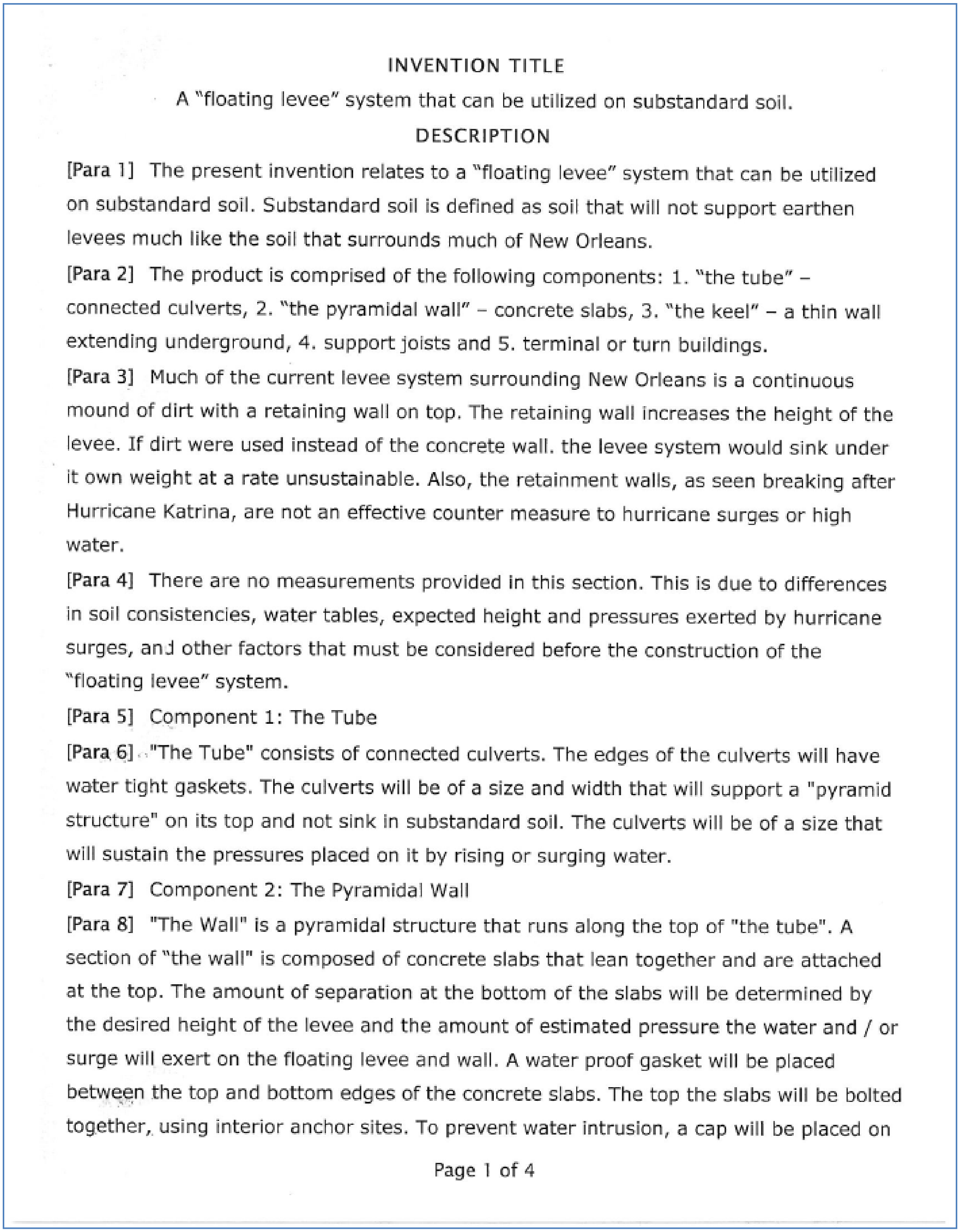


INVENTION TITLE

A "floating levee" system that can be utilized on substandard soil.

DESCRIPTION

[Para 1] The present invention relates to a "floating levee" system that can be utilized on substandard soil. Substandard soil is defined as soil that will not support earthen levees much like the soil that surrounds much of New Orleans.

[Para 2] The product is comprised of the following components: 1. "the tube" – connected culverts, 2. "the pyramidal wall" – concrete slabs, 3. "the keel" – a thin wall extending underground, 4. support joists and 5. terminal or turn buildings.

[Para 3] Much of the current levee system surrounding New Orleans is a continuous mound of dirt with a retaining wall on top. The retaining wall increases the height of the levee. If dirt were used instead of the concrete wall. the levee system would sink under it own weight at a rate unsustainable. Also, the retainment walls, as seen breaking after Hurricane Katrina, are not an effective counter measure to hurricane surges or high water.

[Para 4] There are no measurements provided in this section. This is due to differences in soil consistencies, water tables, expected height and pressures exerted by hurricane surges, and other factors that must be considered before the construction of the "floating levee" system.

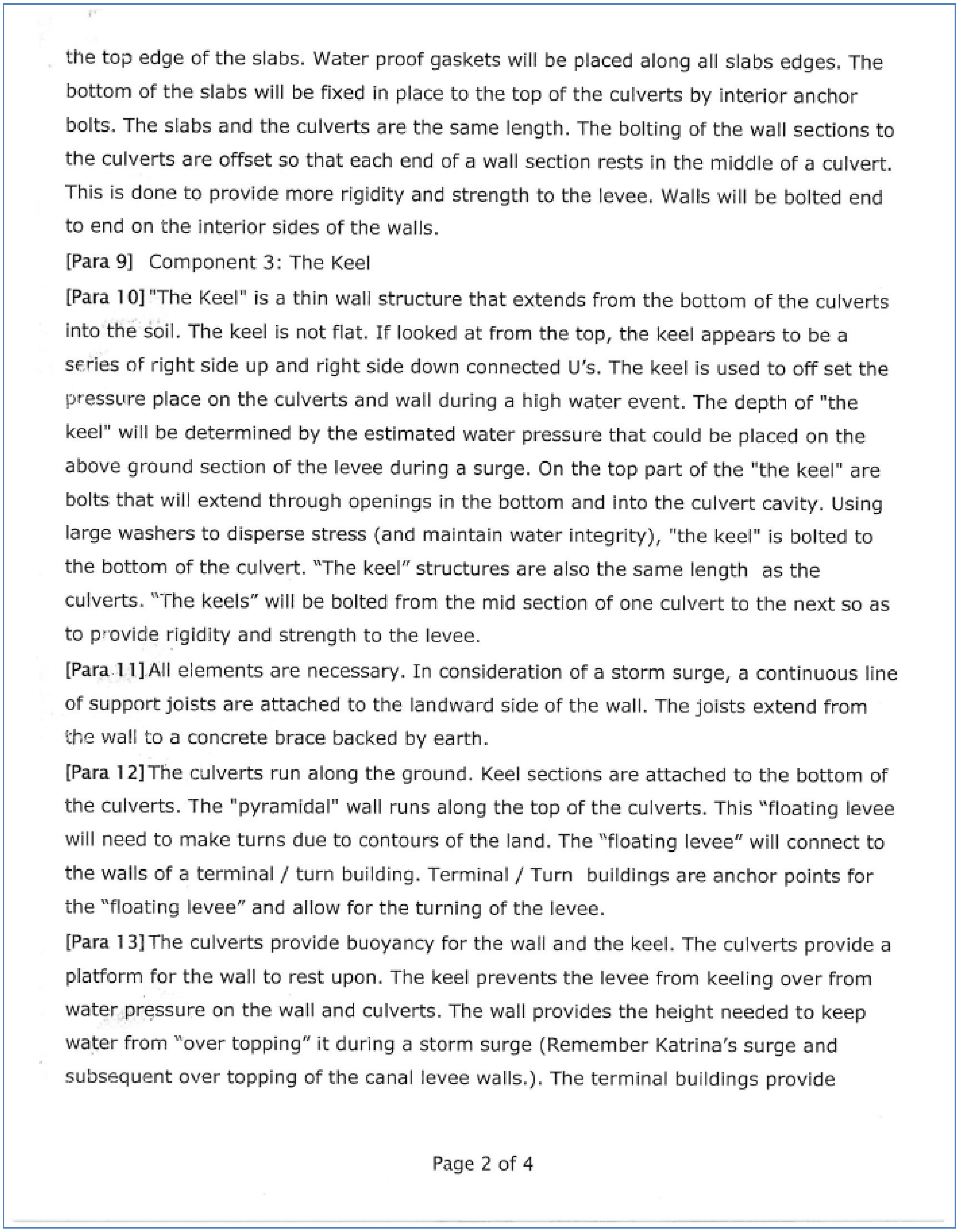
[Para 5] Component 1: The Tube

[Para 6] "The Tube" consists of connected culverts. The edges of the culverts will have water tight gaskets. The culverts will be of a size and width that will support a "pyramid structure" on its top and not sink in substandard soil. The culverts will be of a size that will sustain the pressures placed on it by rising or surging water.

[Para 7] Component 2: The Pyramidal Wall

[Para 8] "The Wall" is a pyramidal structure that runs along the top of "the tube". A section of "the wall" is composed of concrete slabs that lean together and are attached at the top. The amount of separation at the bottom of the slabs will be determined by the desired height of the levee and the amount of estimated pressure the water and / or surge will exert on the floating levee and wall. A water proof gasket will be placed between the top and bottom edges of the concrete slabs. The top the slabs will be bolted together, using interior anchor sites. To prevent water intrusion, a cap will be placed on

Page 1 of 4



the top edge of the slabs. Water proof gaskets will be placed along all slabs edges. The bottom of the slabs will be fixed in place to the top of the culverts by interior anchor bolts. The slabs and the culverts are the same length. The bolting of the wall sections to the culverts are offset so that each end of a wall section rests in the middle of a culvert. This is done to provide more rigidity and strength to the levee. Walls will be bolted end to end on the interior sides of the walls.

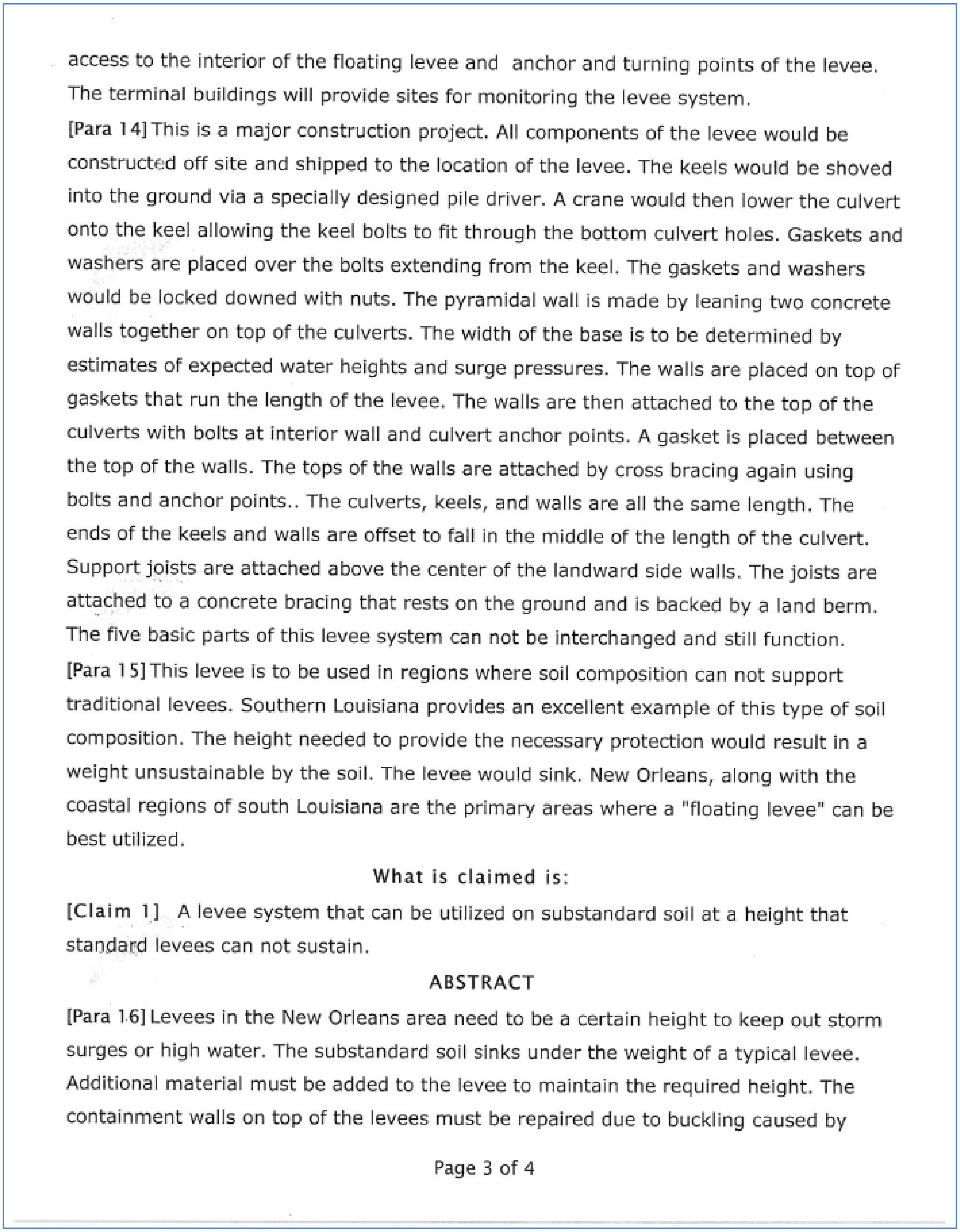
[Para 9] Component 3: The Keel

[Para 10] "The Keel" is a thin wall structure that extends from the bottom of the culverts into the soil. The keel is not flat. If looked at from the top, the keel appears to be a series of right side up and right side down connected U's. The keel is used to off set the pressure place on the culverts and wall during a high water event. The depth of "the keel" will be determined by the estimated water pressure that could be placed on the above ground section of the levee during a surge. On the top part of the "the keel" are bolts that will extend through openings in the bottom and into the culvert cavity. Using large washers to disperse stress (and maintain water integrity), "the keel" is bolted to the bottom of the culvert. "The keel" structures are also the same length as the culverts. "The keels" will be bolted from the mid section of one culvert to the next so as to provide rigidity and strength to the levee.

[Para 11] All elements are necessary. In consideration of a storm surge, a continuous line of support joists are attached to the landward side of the wall. The joists extend from the wall to a concrete brace backed by earth.

[Para 12] The culverts run along the ground. Keel sections are attached to the bottom of the culverts. The "pyramidal" wall runs along the top of the culverts. This "floating levee will need to make turns due to contours of the land. The "floating levee" will connect to the walls of a terminal / turn building. Terminal / Turn buildings are anchor points for the "floating levee" and allow for the turning of the levee.

[Para 13] The culverts provide buoyancy for the wall and the keel. The culverts provide a platform for the wall to rest upon. The keel prevents the levee from keeling over from water pressure on the wall and culverts. The wall provides the height needed to keep water from "over topping" it during a storm surge (Remember Katrina's surge and subsequent over topping of the canal levee walls.). The terminal buildings provide



access to the interior of the floating levee and anchor and turning points of the levee. The terminal buildings will provide sites for monitoring the levee system.

[Para 14] This is a major construction project. All components of the levee would be constructed off site and shipped to the location of the levee. The keels would be shoved into the ground via a specially designed pile driver. A crane would then lower the culvert onto the keel allowing the keel bolts to fit through the bottom culvert holes. Gaskets and washers are placed over the bolts extending from the keel. The gaskets and washers would be locked downed with nuts. The pyramidal wall is made by leaning two concrete walls together on top of the culverts. The width of the base is to be determined by estimates of expected water heights and surge pressures. The walls are placed on top of gaskets that run the length of the levee. The walls are then attached to the top of the culverts with bolts at interior wall and culvert anchor points. A gasket is placed between the top of the walls. The tops of the walls are attached by cross bracing again using bolts and anchor points.. The culverts, keels, and walls are all the same length. The ends of the keels and walls are offset to fall in the middle of the length of the culvert. Support joists are attached above the center of the landward side walls. The joists are attached to a concrete bracing that rests on the ground and is backed by a land berm. The five basic parts of this levee system can not be interchanged and still function.

[Para 15] This levee is to be used in regions where soil composition can not support traditional levees. Southern Louisiana provides an excellent example of this type of soil composition. The height needed to provide the necessary protection would result in a weight unsustainable by the soil. The levee would sink. New Orleans, along with the coastal regions of south Louisiana are the primary areas where a "floating levee" can be best utilized.

What is claimed is:

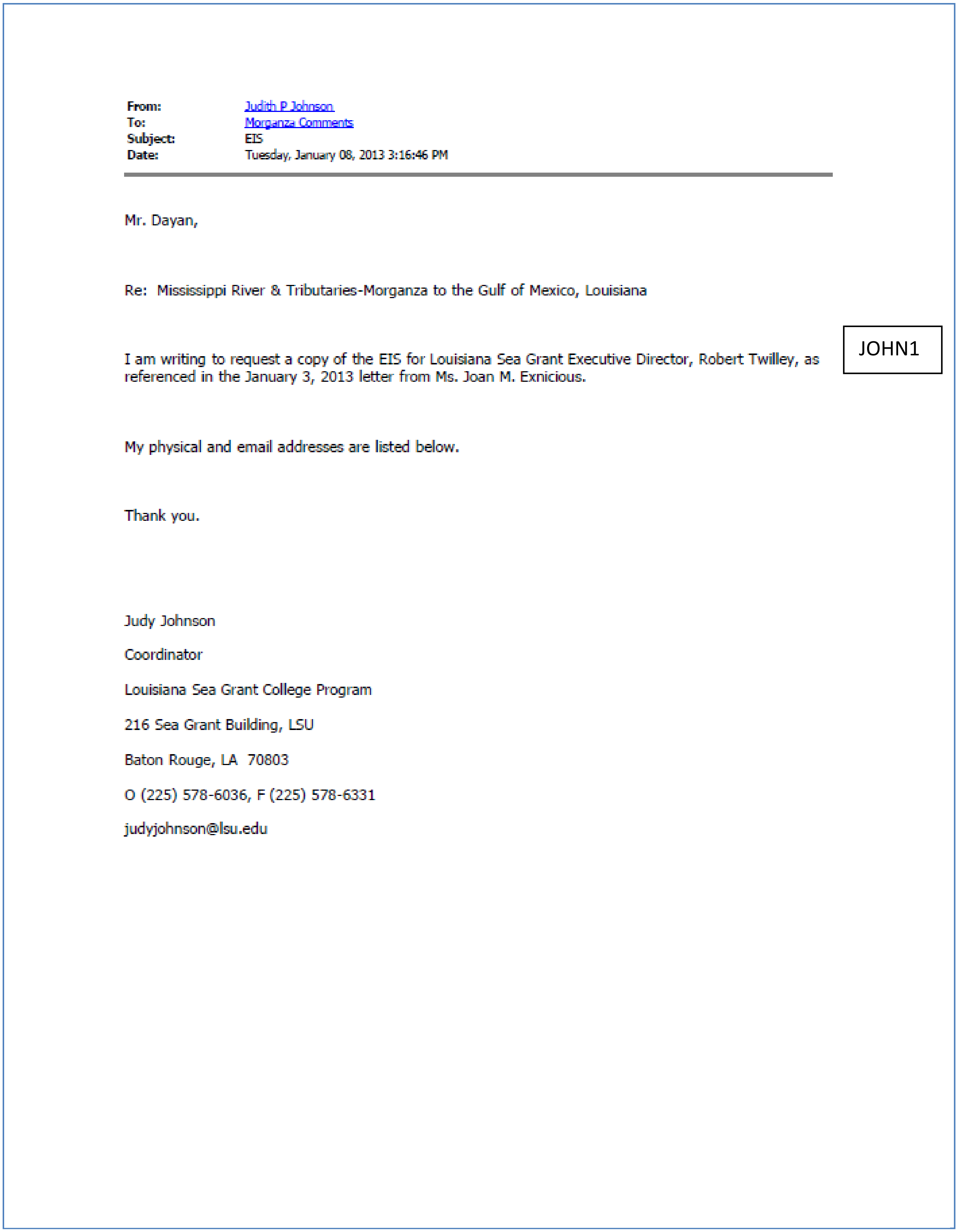
[Claim 1] A levee system that can be utilized on substandard soil at a height that standard levees can not sustain.

ABSTRACT

[Para 16] Levees in the New Orleans area need to be a certain height to keep out storm surges or high water. The substandard soil sinks under the weight of a typical levee. Additional material must be added to the levee to maintain the required height. The containment walls on top of the levees must be repaired due to buckling caused by

sinkage of the levee system. My levee system floats on the substandard soil that the present levee system sinks into.

Page 4 of 4



From: Judith P Johnson
To: Morganza Comments
Subject: EIS
Date: Tuesday, January 08, 2013 3:16:46 PM

Mr. Dayan,

Re: Mississippi River & Tributaries-Morganza to the Gulf of Mexico, Louisiana

JOHN1

I am writing to request a copy of the EIS for Louisiana Sea Grant Executive Director, Robert Twilley, as referenced in the January 3, 2013 letter from Ms. Joan M. Exnicious.

My physical and email addresses are listed below.

Thank you.

Judy Johnson

Coordinator

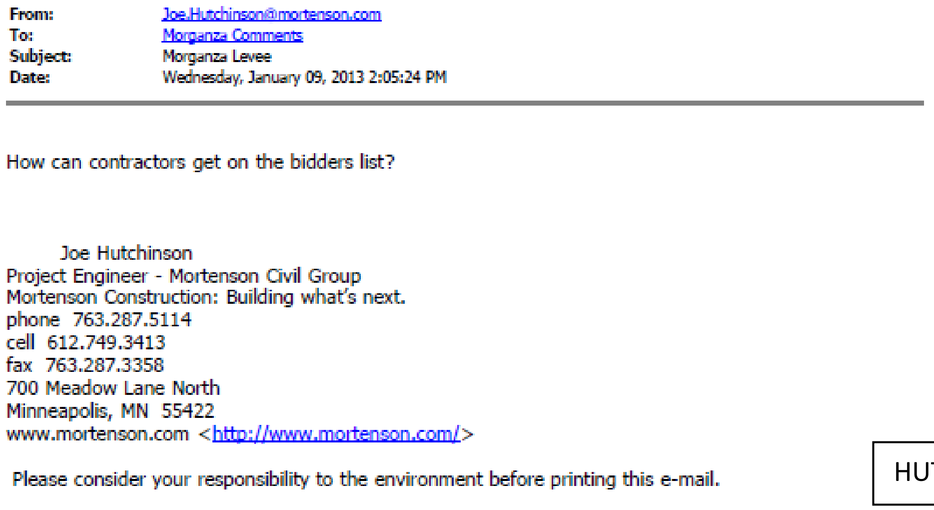
Louisiana Sea Grant College Program

216 Sea Grant Building, LSU

Baton Rouge, LA 70803

O (225) 578-6036, F (225) 578-6331

judyjohnson@lsu.edu



From: Joe.Hutchinson@mortenson.com
To: Morganza Comments
Subject: Morganza Levee
Date: Wednesday, January 09, 2013 2:05:24 PM

How can contractors get on the bidders list?

Joe Hutchinson
Project Engineer - Mortenson Civil Group
Mortenson Construction: Building what's next.
phone 763.287.5114
cell 612.749.3413
fax 763.287.3358
700 Meadow Lane North
Minneapolis, MN 55422
www.mortenson.com <http://www.mortenson.com/>

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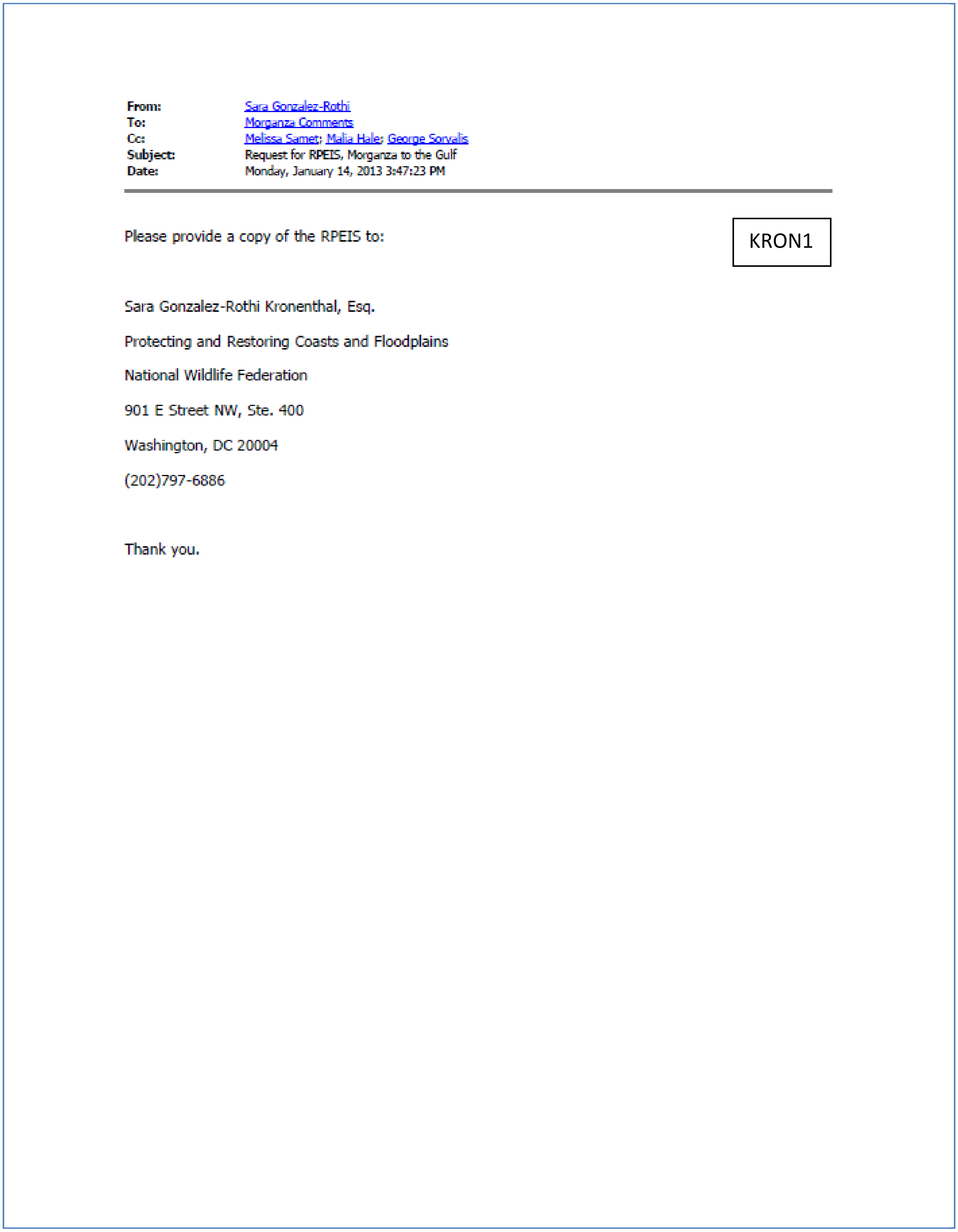
HUTC1

1.



From: Sara Gonzalez-Rothi
To: Morganza Comments
Cc: Melissa Samet; Malia Hale; George Sorvalis
Subject: Request for RPEIS, Morganza to the Gulf
Date: Monday, January 14, 2013 3:47:23 PM

KRON1

Please provide a copy of the RPEIS to:

Sara Gonzalez-Rothi Kronenthal, Esq.

Protecting and Restoring Coasts and Floodplains

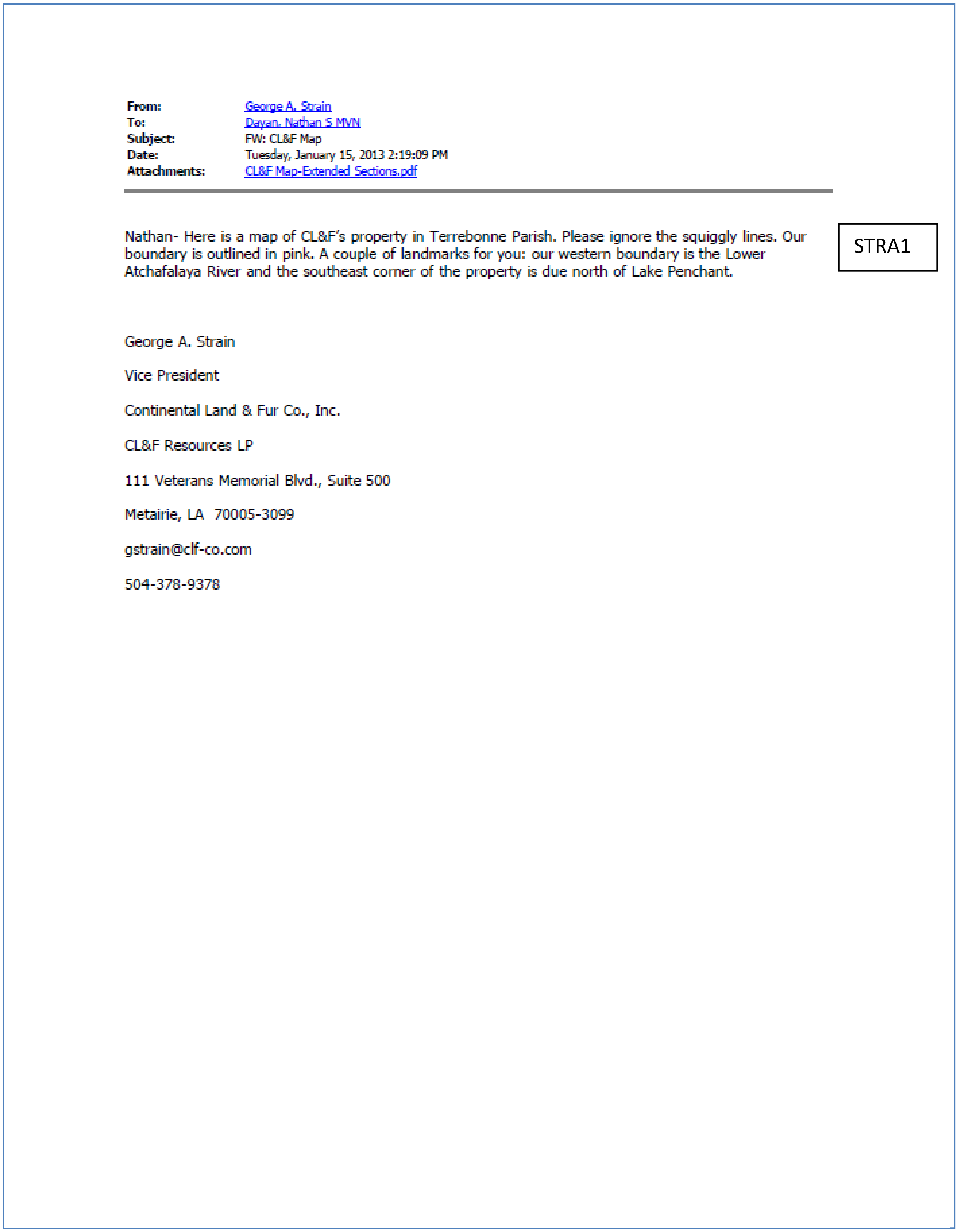
National Wildlife Federation

901 E Street NW, Ste. 400

Washington, DC 20004

(202)797-6886

Thank you.



From: George A. Strain
To: Dayan, Nathan S MVN
Subject: FW: CL&F Map
Date: Tuesday, January 15, 2013 2:19:09 PM
Attachments: CL&F Map-Extended Sections.pdf

STRA1

Nathan- Here is a map of CL&F's property in Terrebonne Parish. Please ignore the squiggly lines. Our boundary is outlined in pink. A couple of landmarks for you: our western boundary is the Lower Atchafalaya River and the southeast corner of the property is due north of Lake Penchant.

George A. Strain

Vice President

Continental Land & Fur Co., Inc.

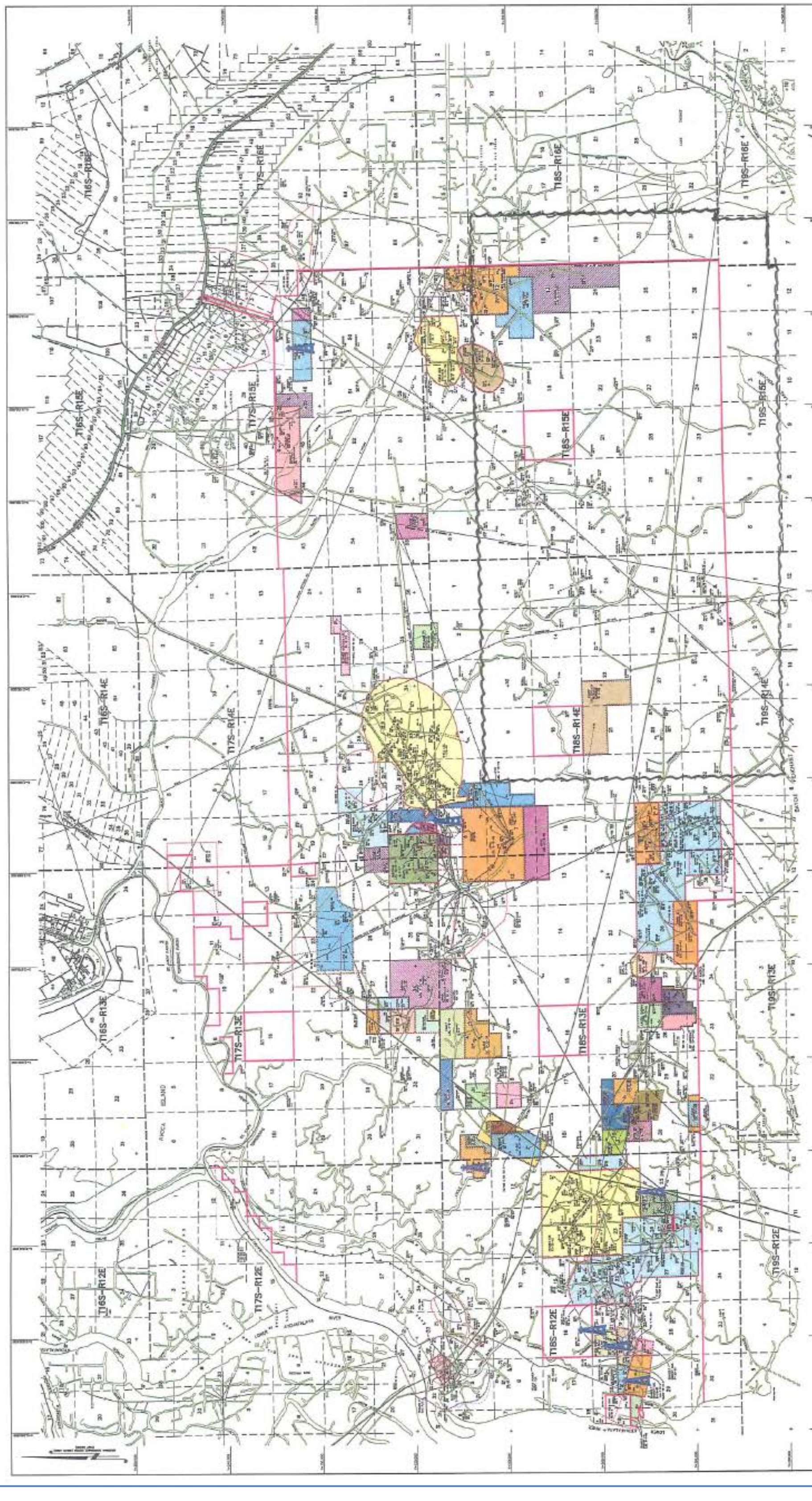
CL&F Resources LP

111 Veterans Memorial Blvd., Suite 500

Metairie, LA 70005-3099

gstrain@clf-co.com

504-378-9378


T16S-R16E
T17S-R16E
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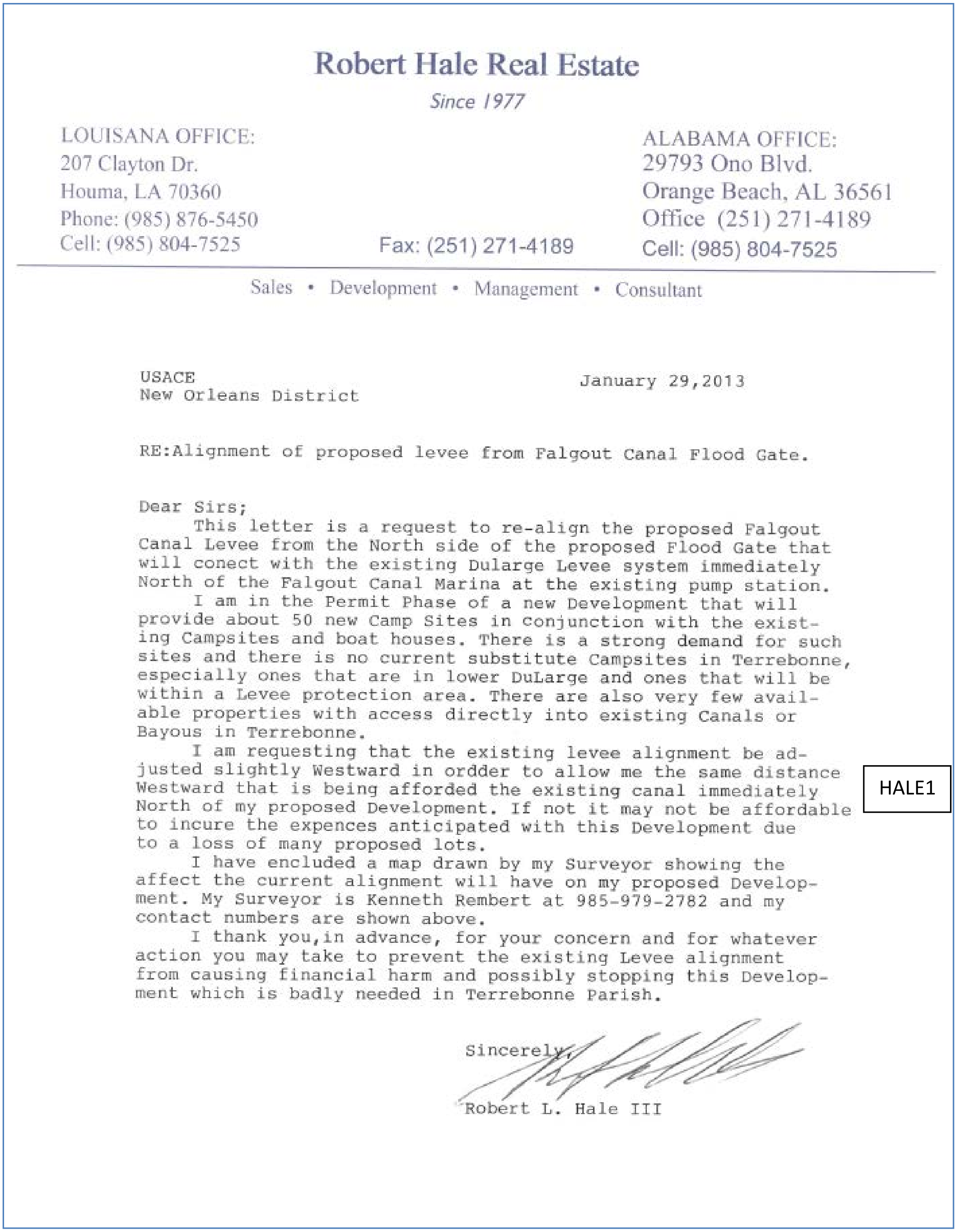

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USACE
New Orleans District

January 29,2013

RE:Alignment of proposed levee from Falgout Canal Flood Gate.

Dear Sirs;

This letter is a request to re-align the proposed Falgout Canal Levee from the North side of the proposed Flood Gate that will conect with the existing Dularge Levee system immediately North of the Falgout Canal Marina at the existing pump station.

I am in the Permit Phase of a new Development that will provide about 50 new Camp Sites in conjunction with the existing Campsites and boat houses. There is a strong demand for such sites and there is no current substitute Campsites in Terrebonne, especially ones that are in lower DuLarge and ones that will be within a Levee protection area. There are also very few available properties with access directly into existing Canals or Bayous in Terrebonne.

I am requesting that the existing levee alignment be adjusted slightly Westward in ordder to allow me the same distance Westward that is being afforded the existing canal immediately North of my proposed Development. If not it may not be affordable to incure the expences anticipated with this Development due to a loss of many proposed lots.

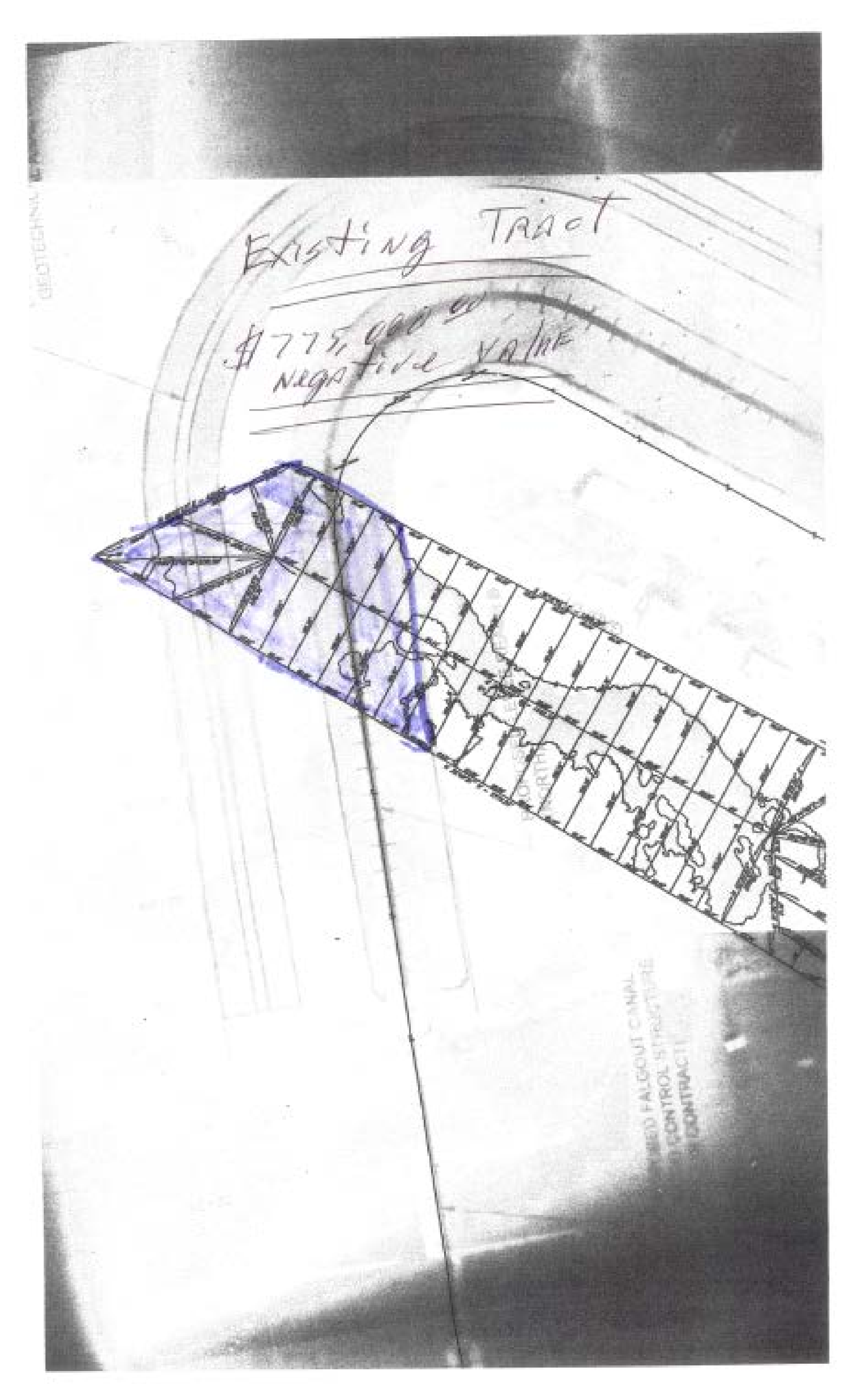
I have encluded a map drawn by my Surveyor showing the affect the current alignment will have on my proposed Development. My Surveyor is Kenneth Rembert at 985-979-2782 and my contact numbers are shown above.

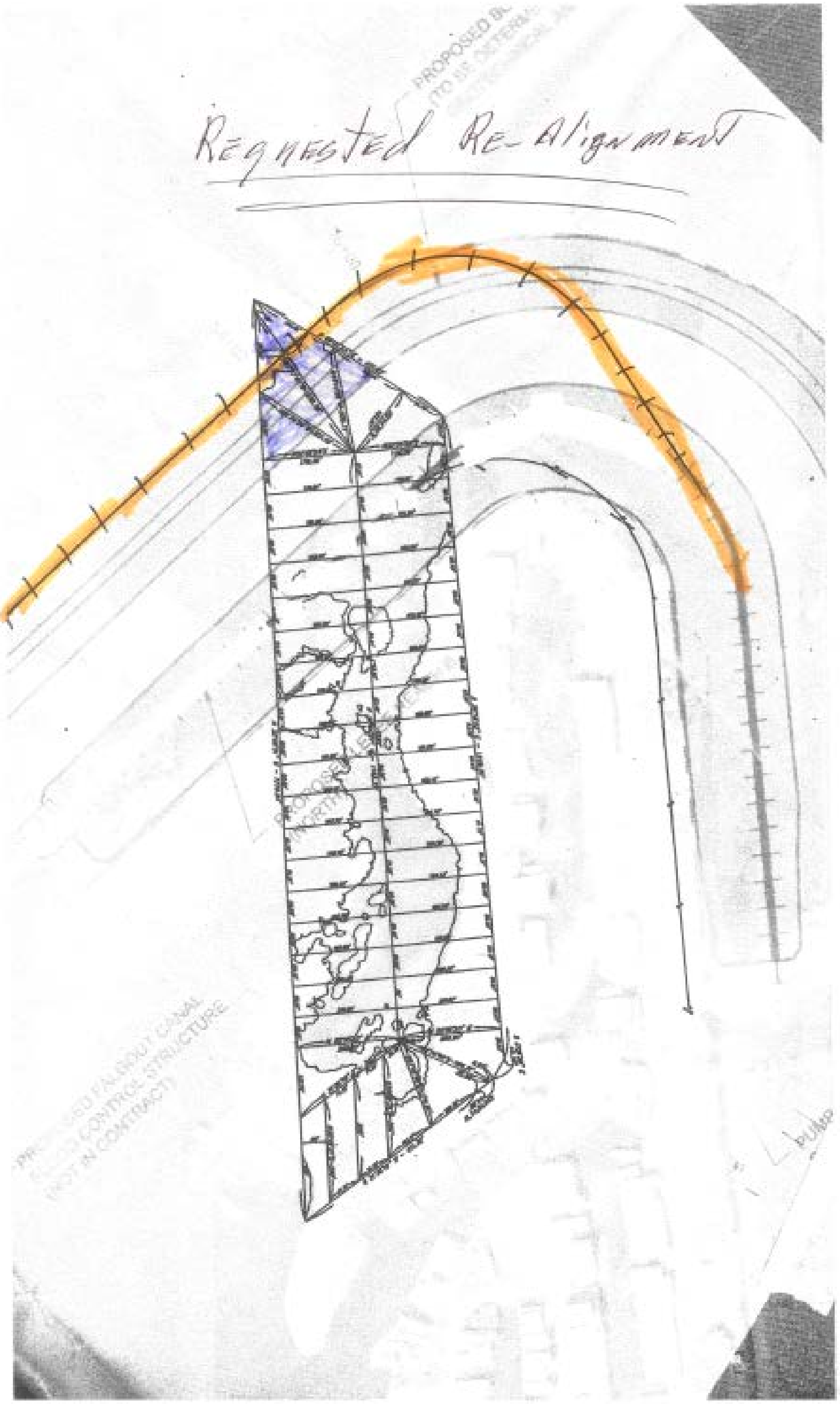
I thank you,in advance, for your concern and for whatever action you may take to prevent the existing Levee alignment from causing financial harm and possibly stopping this Development which is badly needed in Terrebonne Parish.

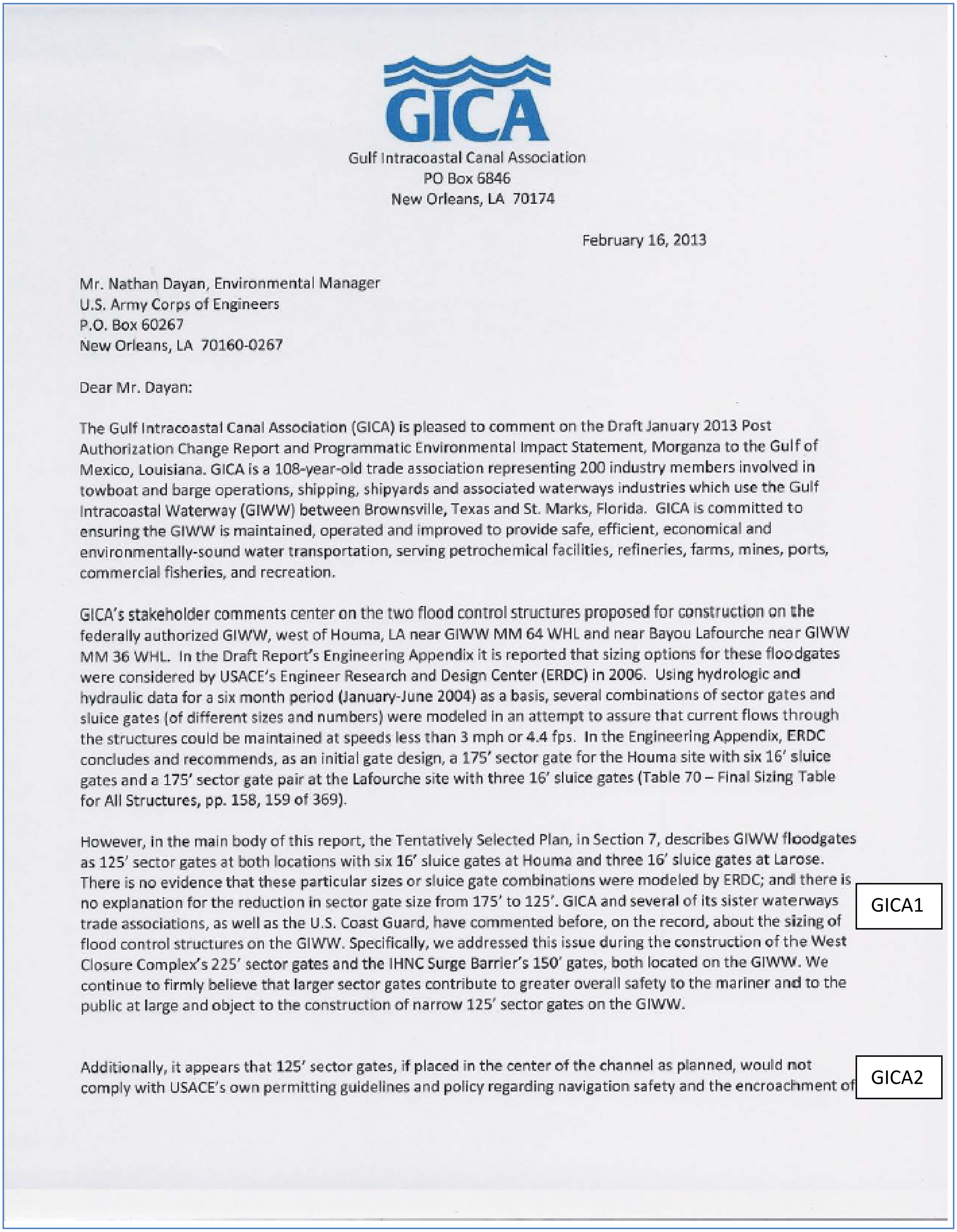
Sincerely,

Robert L. Hale III

HALE1


Existing Tract
$775,000.00
negative value
GEOTECHNI
FALGOUT CANAL
CONTROL STRUCTURE
CONTRACT


Requested Re-Alignment
PROPOSED B
PROPOSED FALGOUT CANAL
FLOOD CONTROL STRUCTURE
(NOT IN CONTRACT)
PUMP



GICA
Gulf Intracoastal Canal Association
PO Box 6846
New Orleans, LA 70174

February 16, 2013

Mr. Nathan Dayan, Environmental Manager
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Dayan:

The Gulf Intracoastal Canal Association (GICA) is pleased to comment on the Draft January 2013 Post Authorization Change Report and Programmatic Environmental Impact Statement, Morganza to the Gulf of Mexico, Louisiana. GICA is a 108-year-old trade association representing 200 industry members involved in towboat and barge operations, shipping, shipyards and associated waterways industries which use the Gulf Intracoastal Waterway (GIWW) between Brownsville, Texas and St. Marks, Florida. GICA is committed to ensuring the GIWW is maintained, operated and improved to provide safe, efficient, economical and environmentally-sound water transportation, serving petrochemical facilities, refineries, farms, mines, ports, commercial fisheries, and recreation.

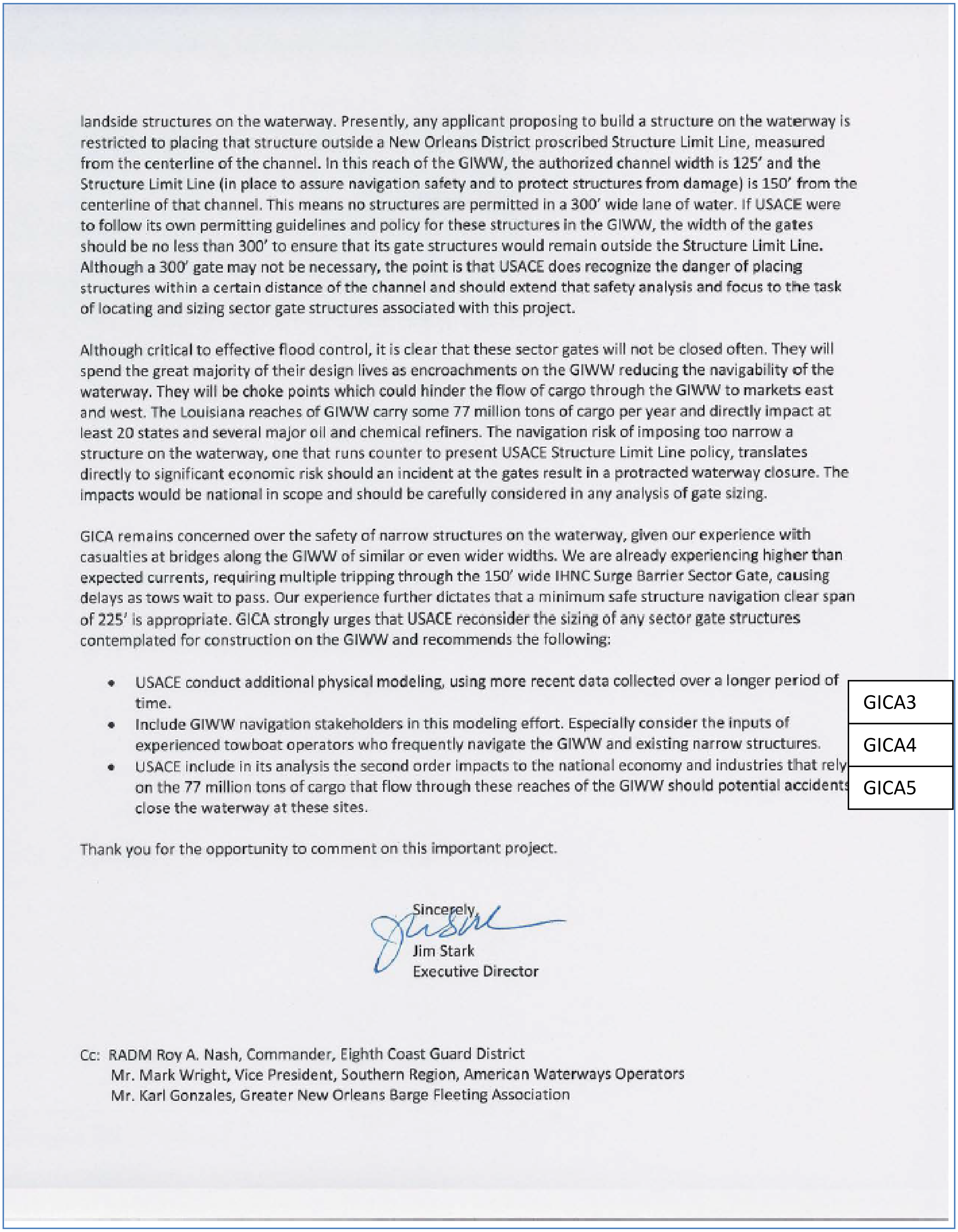
GICA's stakeholder comments center on the two flood control structures proposed for construction on the federally authorized GIWW, west of Houma, LA near GIWW MM 64 WHL and near Bayou Lafourche near GIWW MM 36 WHL. In the Draft Report's Engineering Appendix it is reported that sizing options for these floodgates were considered by USACE's Engineer Research and Design Center (ERDC) in 2006. Using hydrologic and hydraulic data for a six month period (January-June 2004) as a basis, several combinations of sector gates and sluice gates (of different sizes and numbers) were modeled in an attempt to assure that current flows through the structures could be maintained at speeds less than 3 mph or 4.4 fps. In the Engineering Appendix, ERDC concludes and recommends, as an initial gate design, a 175' sector gate for the Houma site with six 16' sluice gates and a 175' sector gate pair at the Lafourche site with three 16' sluice gates (Table 70 – Final Sizing Table for All Structures, pp. 158, 159 of 369).

However, in the main body of this report, the Tentatively Selected Plan, in Section 7, describes GIWW floodgates as 125' sector gates at both locations with six 16' sluice gates at Houma and three 16' sluice gates at Larose. There is no evidence that these particular sizes or sluice gate combinations were modeled by ERDC; and there is no explanation for the reduction in sector gate size from 175' to 125'. GICA and several of its sister waterways trade associations, as well as the U.S. Coast Guard, have commented before, on the record, about the sizing of flood control structures on the GIWW. Specifically, we addressed this issue during the construction of the West Closure Complex's 225' sector gates and the IHNC Surge Barrier's 150' gates, both located on the GIWW. We continue to firmly believe that larger sector gates contribute to greater overall safety to the mariner and to the public at large and object to the construction of narrow 125' sector gates on the GIWW.

GICA1

Additionally, it appears that 125' sector gates, if placed in the center of the channel as planned, would not comply with USACE's own permitting guidelines and policy regarding navigation safety and the encroachment of

GICA2



landside structures on the waterway. Presently, any applicant proposing to build a structure on the waterway is restricted to placing that structure outside a New Orleans District proscribed Structure Limit Line, measured from the centerline of the channel. In this reach of the GIWW, the authorized channel width is 125' and the Structure Limit Line (in place to assure navigation safety and to protect structures from damage) is 150' from the centerline of that channel. This means no structures are permitted in a 300' wide lane of water. If USACE were to follow its own permitting guidelines and policy for these structures in the GIWW, the width of the gates should be no less than 300' to ensure that its gate structures would remain outside the Structure Limit Line. Although a 300' gate may not be necessary, the point is that USACE does recognize the danger of placing structures within a certain distance of the channel and should extend that safety analysis and focus to the task of locating and sizing sector gate structures associated with this project.

Although critical to effective flood control, it is clear that these sector gates will not be closed often. They will spend the great majority of their design lives as encroachments on the GIWW reducing the navigability of the waterway. They will be choke points which could hinder the flow of cargo through the GIWW to markets east and west. The Louisiana reaches of GIWW carry some 77 million tons of cargo per year and directly impact at least 20 states and several major oil and chemical refiners. The navigation risk of imposing too narrow a structure on the waterway, one that runs counter to present USACE Structure Limit Line policy, translates directly to significant economic risk should an incident at the gates result in a protracted waterway closure. The impacts would be national in scope and should be carefully considered in any analysis of gate sizing.

GICA remains concerned over the safety of narrow structures on the waterway, given our experience with casualties at bridges along the GIWW of similar or even wider widths. We are already experiencing higher than expected currents, requiring multiple tripping through the 150' wide IHNC Surge Barrier Sector Gate, causing delays as tows wait to pass. Our experience further dictates that a minimum safe structure navigation clear span of 225' is appropriate. GICA strongly urges that USACE reconsider the sizing of any sector gate structures contemplated for construction on the GIWW and recommends the following:

- USACE conduct additional physical modeling, using more recent data collected over a longer period of time.
- Include GIWW navigation stakeholders in this modeling effort. Especially consider the inputs of experienced towboat operators who frequently navigate the GIWW and existing narrow structures.
- USACE include in its analysis the second order impacts to the national economy and industries that rely on the 77 million tons of cargo that flow through these reaches of the GIWW should potential accidents close the waterway at these sites.

GICA3

GICA4

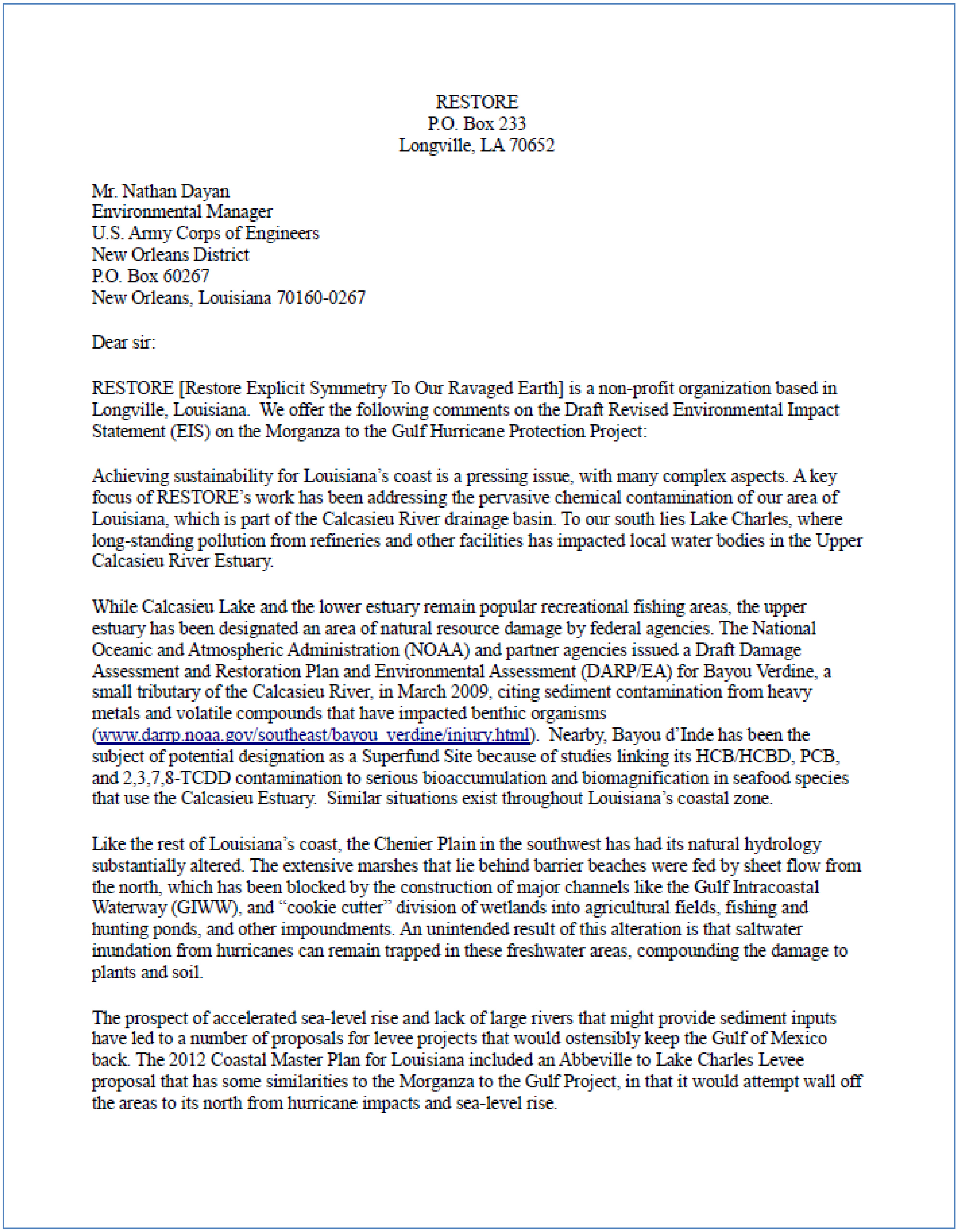
GICA5

Thank you for the opportunity to comment on this important project.

Sincerely,

Jim Stark
Executive Director

Cc: RADM Roy A. Nash, Commander, Eighth Coast Guard District
Mr. Mark Wright, Vice President, Southern Region, American Waterways Operators
Mr. Karl Gonzales, Greater New Orleans Barge Fleeting Association



RESTORE
P.O. Box 233
Longville, LA 70652

Mr. Nathan Dayan
Environmental Manager
U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear sir:

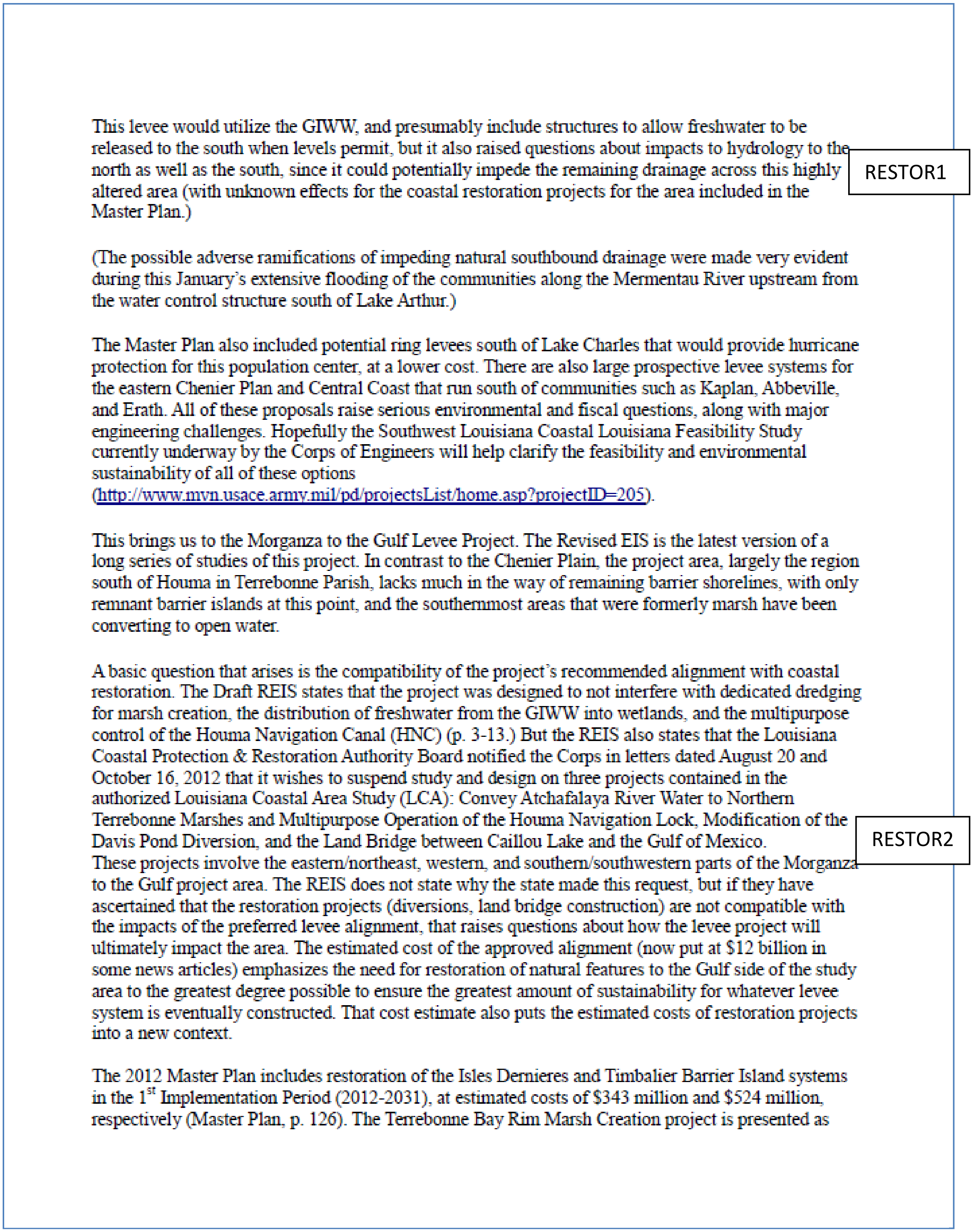
RESTORE [Restore Explicit Symmetry To Our Ravaged Earth] is a non-profit organization based in Longville, Louisiana. We offer the following comments on the Draft Revised Environmental Impact Statement (EIS) on the Morganza to the Gulf Hurricane Protection Project:

Achieving sustainability for Louisiana's coast is a pressing issue, with many complex aspects. A key focus of RESTORE's work has been addressing the pervasive chemical contamination of our area of Louisiana, which is part of the Calcasieu River drainage basin. To our south lies Lake Charles, where long-standing pollution from refineries and other facilities has impacted local water bodies in the Upper Calcasieu River Estuary.

While Calcasieu Lake and the lower estuary remain popular recreational fishing areas, the upper estuary has been designated an area of natural resource damage by federal agencies. The National Oceanic and Atmospheric Administration (NOAA) and partner agencies issued a Draft Damage Assessment and Restoration Plan and Environmental Assessment (DARP/EA) for Bayou Verdine, a small tributary of the Calcasieu River, in March 2009, citing sediment contamination from heavy metals and volatile compounds that have impacted benthic organisms (www.darrp.noaa.gov/southeast/bayou_verdine/injury.html). Nearby, Bayou d'Inde has been the subject of potential designation as a Superfund Site because of studies linking its HCB/HCBD, PCB, and 2,3,7,8-TCDD contamination to serious bioaccumulation and biomagnification in seafood species that use the Calcasieu Estuary. Similar situations exist throughout Louisiana's coastal zone.

Like the rest of Louisiana's coast, the Chenier Plain in the southwest has had its natural hydrology substantially altered. The extensive marshes that lie behind barrier beaches were fed by sheet flow from the north, which has been blocked by the construction of major channels like the Gulf Intracoastal Waterway (GIWW), and "cookie cutter" division of wetlands into agricultural fields, fishing and hunting ponds, and other impoundments. An unintended result of this alteration is that saltwater inundation from hurricanes can remain trapped in these freshwater areas, compounding the damage to plants and soil.

The prospect of accelerated sea-level rise and lack of large rivers that might provide sediment inputs have led to a number of proposals for levee projects that would ostensibly keep the Gulf of Mexico back. The 2012 Coastal Master Plan for Louisiana included an Abbeville to Lake Charles Levee proposal that has some similarities to the Morganza to the Gulf Project, in that it would attempt wall off the areas to its north from hurricane impacts and sea-level rise.



This levee would utilize the GIWW, and presumably include structures to allow freshwater to be released to the south when levels permit, but it also raised questions about impacts to hydrology to the north as well as the south, since it could potentially impede the remaining drainage across this highly altered area (with unknown effects for the coastal restoration projects for the area included in the Master Plan.)

RESTOR1

(The possible adverse ramifications of impeding natural southbound drainage were made very evident during this January's extensive flooding of the communities along the Mermentau River upstream from the water control structure south of Lake Arthur.)

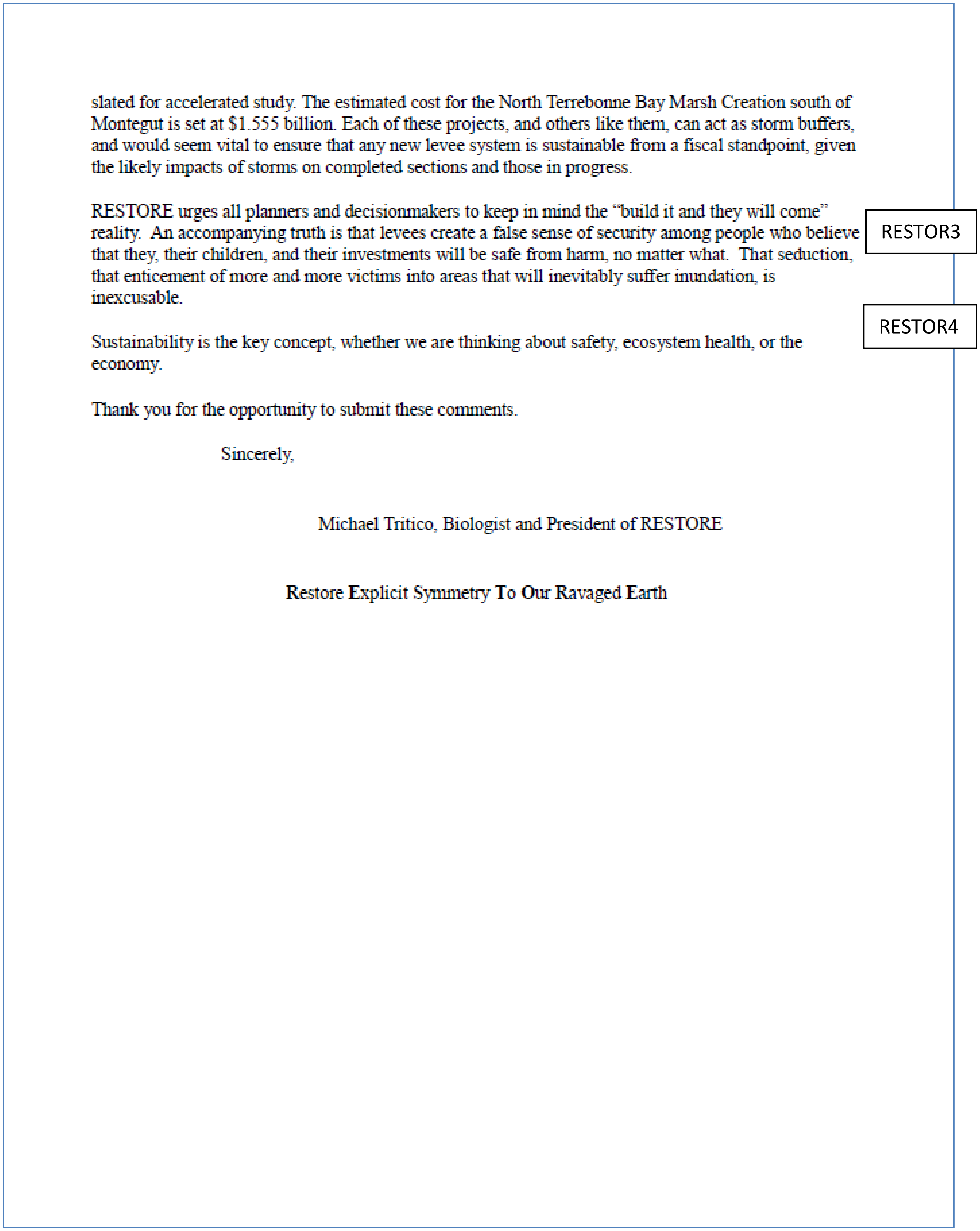
The Master Plan also included potential ring levees south of Lake Charles that would provide hurricane protection for this population center, at a lower cost. There are also large prospective levee systems for the eastern Chenier Plan and Central Coast that run south of communities such as Kaplan, Abbeville, and Erath. All of these proposals raise serious environmental and fiscal questions, along with major engineering challenges. Hopefully the Southwest Louisiana Coastal Louisiana Feasibility Study currently underway by the Corps of Engineers will help clarify the feasibility and environmental sustainability of all of these options (http://www.mvn.usace.army.mil/pd/projectsList/home.asp?projectID=205).

This brings us to the Morganza to the Gulf Levee Project. The Revised EIS is the latest version of a long series of studies of this project. In contrast to the Chenier Plain, the project area, largely the region south of Houma in Terrebonne Parish, lacks much in the way of remaining barrier shorelines, with only remnant barrier islands at this point, and the southernmost areas that were formerly marsh have been converting to open water.

A basic question that arises is the compatibility of the project's recommended alignment with coastal restoration. The Draft REIS states that the project was designed to not interfere with dedicated dredging for marsh creation, the distribution of freshwater from the GIWW into wetlands, and the multipurpose control of the Houma Navigation Canal (HNC) (p. 3-13.) But the REIS also states that the Louisiana Coastal Protection & Restoration Authority Board notified the Corps in letters dated August 20 and October 16, 2012 that it wishes to suspend study and design on three projects contained in the authorized Louisiana Coastal Area Study (LCA): Convey Atchafalaya River Water to Northern Terrebonne Marshes and Multipurpose Operation of the Houma Navigation Lock, Modification of the Davis Pond Diversion, and the Land Bridge between Caillou Lake and the Gulf of Mexico. These projects involve the eastern/northeast, western, and southern/southwestern parts of the Morganza to the Gulf project area. The REIS does not state why the state made this request, but if they have ascertained that the restoration projects (diversions, land bridge construction) are not compatible with the impacts of the preferred levee alignment, that raises questions about how the levee project will ultimately impact the area. The estimated cost of the approved alignment (now put at $12 billion in some news articles) emphasizes the need for restoration of natural features to the Gulf side of the study area to the greatest degree possible to ensure the greatest amount of sustainability for whatever levee system is eventually constructed. That cost estimate also puts the estimated costs of restoration projects into a new context.

RESTOR2

The 2012 Master Plan includes restoration of the Isles Dernieres and Timbalier Barrier Island systems in the 1st Implementation Period (2012-2031), at estimated costs of $343 million and $524 million, respectively (Master Plan, p. 126). The Terrebonne Bay Rim Marsh Creation project is presented as



slated for accelerated study. The estimated cost for the North Terrebonne Bay Marsh Creation south of Montegut is set at $1.555 billion. Each of these projects, and others like them, can act as storm buffers, and would seem vital to ensure that any new levee system is sustainable from a fiscal standpoint, given the likely impacts of storms on completed sections and those in progress.

RESTORE urges all planners and decisionmakers to keep in mind the "build it and they will come" reality. An accompanying truth is that levees create a false sense of security among people who believe that they, their children, and their investments will be safe from harm, no matter what. That seduction, that enticement of more and more victims into areas that will inevitably suffer inundation, is inexcusable.

RESTOR3

RESTOR4

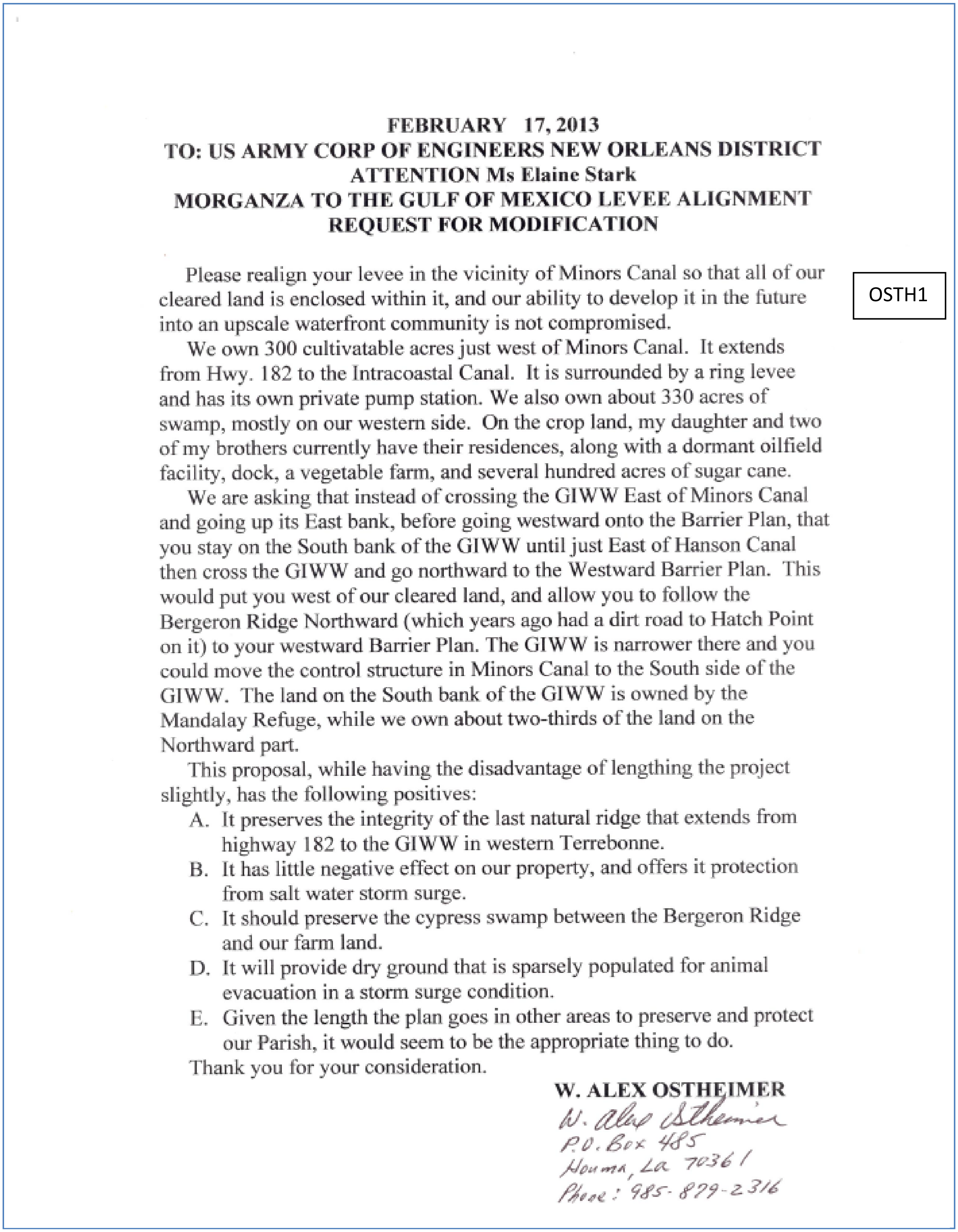
Sustainability is the key concept, whether we are thinking about safety, ecosystem health, or the economy.

Thank you for the opportunity to submit these comments.

Sincerely,

Michael Tritico, Biologist and President of RESTORE

Restore **E**xplicit **S**ymmetry **T**o **O**ur **R**avaged **E**arth



OSTH1

FEBRUARY 17, 2013
TO: US ARMY CORP OF ENGINEERS NEW ORLEANS DISTRICT
ATTENTION Ms Elaine Stark

MORGANZA TO THE GULF OF MEXICO LEVEE ALIGNMENT REQUEST FOR MODIFICATION

Please realign your levee in the vicinity of Minors Canal so that all of our cleared land is enclosed within it, and our ability to develop it in the future into an upscale waterfront community is not compromised.

We own 300 cultivatable acres just west of Minors Canal. It extends from Hwy. 182 to the Intracoastal Canal. It is surrounded by a ring levee and has its own private pump station. We also own about 330 acres of swamp, mostly on our western side. On the crop land, my daughter and two of my brothers currently have their residences, along with a dormant oilfield facility, dock, a vegetable farm, and several hundred acres of sugar cane.

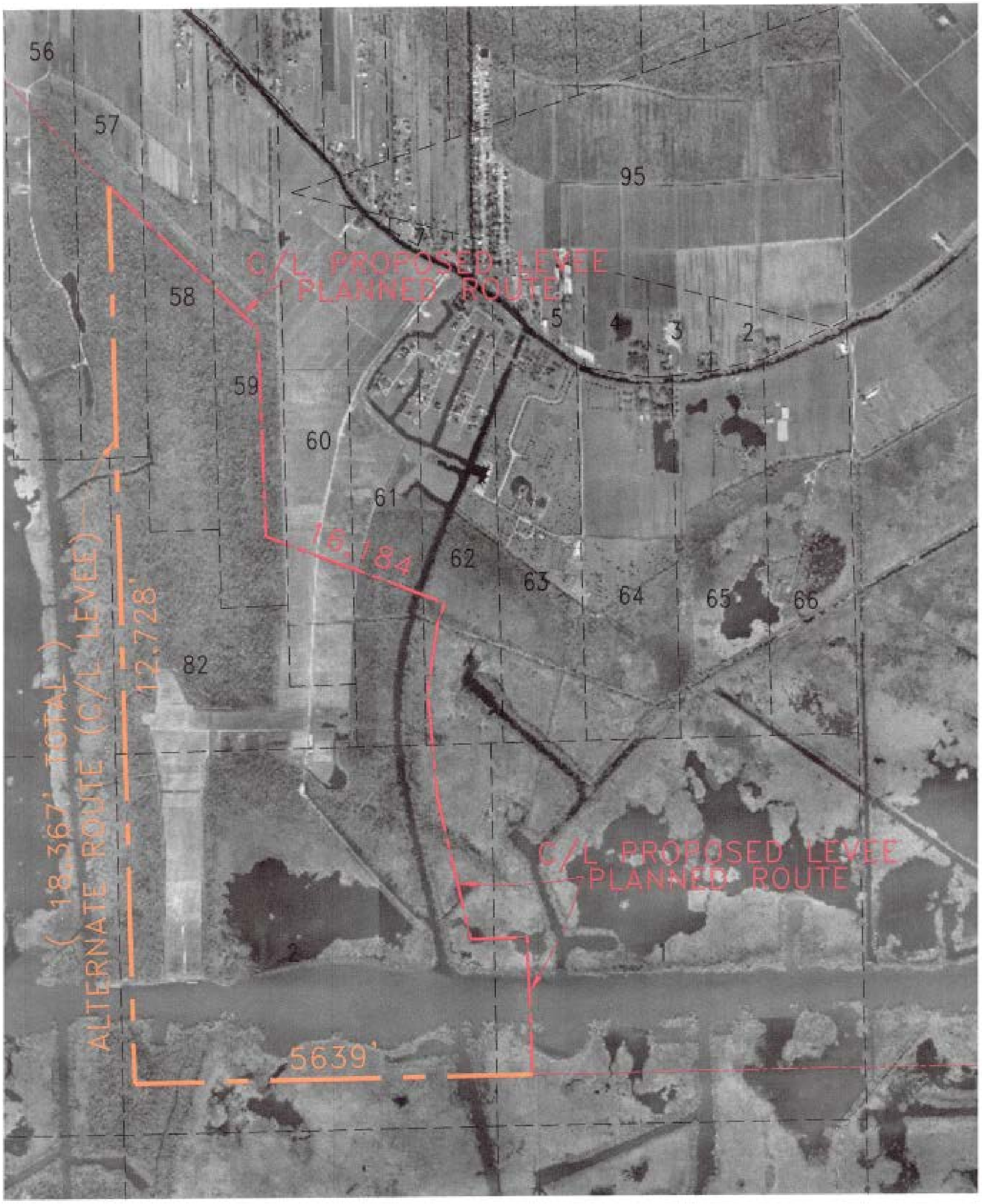
We are asking that instead of crossing the GIWW East of Minors Canal and going up its East bank, before going westward onto the Barrier Plan, that you stay on the South bank of the GIWW until just East of Hanson Canal then cross the GIWW and go northward to the Westward Barrier Plan. This would put you west of our cleared land, and allow you to follow the Bergeron Ridge Northward (which years ago had a dirt road to Hatch Point on it) to your westward Barrier Plan. The GIWW is narrower there and you could move the control structure in Minors Canal to the South side of the GIWW. The land on the South bank of the GIWW is owned by the Mandalay Refuge, while we own about two-thirds of the land on the Northward part.

This proposal, while having the disadvantage of lengthing the project slightly, has the following positives:

A. It preserves the integrity of the last natural ridge that extends from highway 182 to the GIWW in western Terrebonne.
B. It has little negative effect on our property, and offers it protection from salt water storm surge.
C. It should preserve the cypress swamp between the Bergeron Ridge and our farm land.
D. It will provide dry ground that is sparsely populated for animal evacuation in a storm surge condition.
E. Given the length the plan goes in other areas to preserve and protect our Parish, it would seem to be the appropriate thing to do.

Thank you for your consideration.

W. ALEX OSTHEIMER
W. Alex Ostheimer
P.O. Box 485
Houma, La 70361
Phone: 985-879-2316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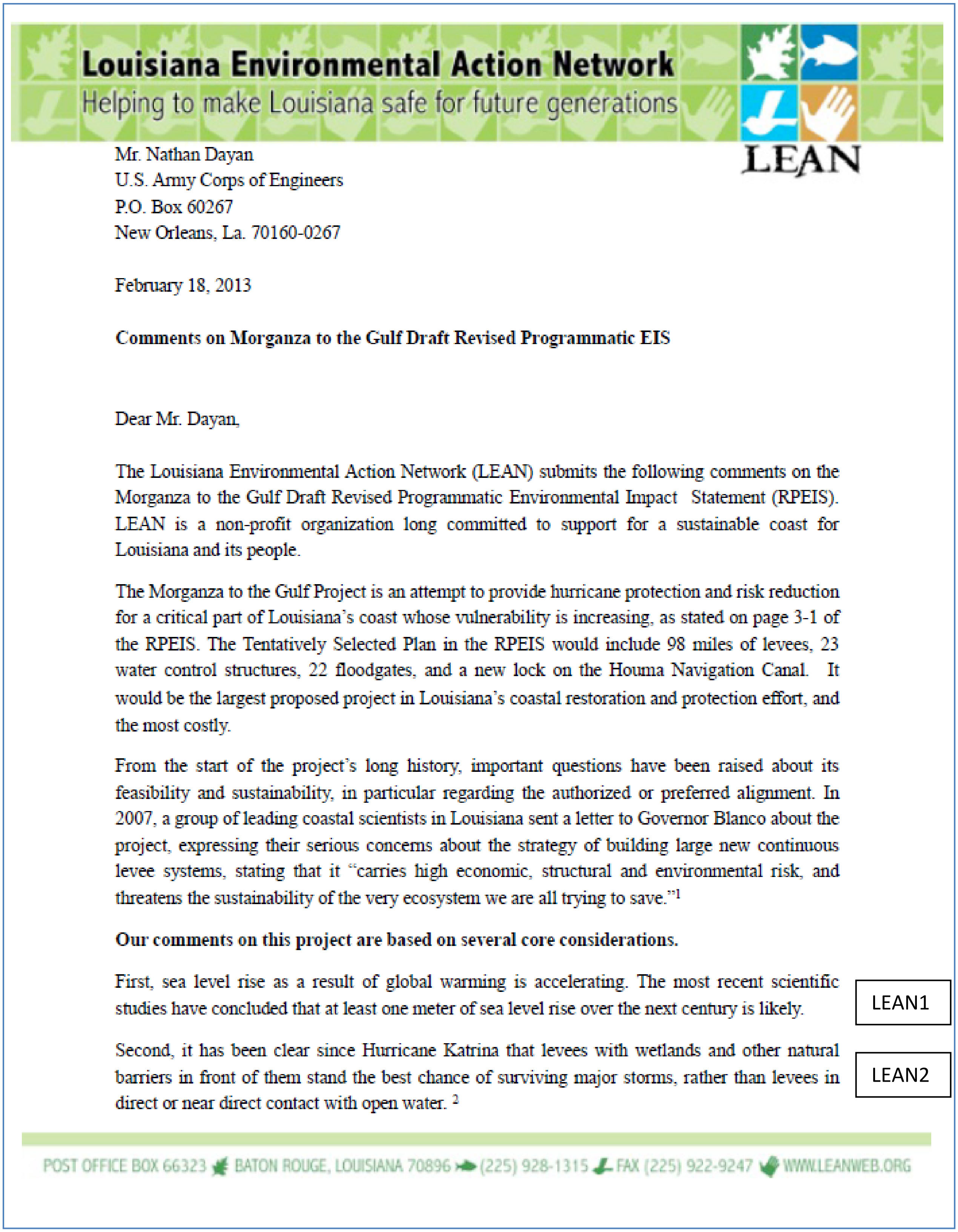
C/L PROPOSED LEVEE
PLANNED ROUTE
16,184
C/L PROPOSED LEVEE
PLANNED ROUTE
(18,367' TOTAL)
ALTERNATE ROUTE (C/L LEVEE)
12,728'
5639'

Ostheimer
Proposed Realignment
2/19/13



Louisiana Environmental Action Network
Helping to make Louisiana safe for future generations
LEAN

Mr. Nathan Dayan
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, La. 70160-0267

February 18, 2013

Comments on Morganza to the Gulf Draft Revised Programmatic EIS

Dear Mr. Dayan,

The Louisiana Environmental Action Network (LEAN) submits the following comments on the Morganza to the Gulf Draft Revised Programmatic Environmental Impact Statement (RPEIS). LEAN is a non-profit organization long committed to support for a sustainable coast for Louisiana and its people.

The Morganza to the Gulf Project is an attempt to provide hurricane protection and risk reduction for a critical part of Louisiana's coast whose vulnerability is increasing, as stated on page 3-1 of the RPEIS. The Tentatively Selected Plan in the RPEIS would include 98 miles of levees, 23 water control structures, 22 floodgates, and a new lock on the Houma Navigation Canal. It would be the largest proposed project in Louisiana's coastal restoration and protection effort, and the most costly.

From the start of the project's long history, important questions have been raised about its feasibility and sustainability, in particular regarding the authorized or preferred alignment. In 2007, a group of leading coastal scientists in Louisiana sent a letter to Governor Blanco about the project, expressing their serious concerns about the strategy of building large new continuous levee systems, stating that it "carries high economic, structural and environmental risk, and threatens the sustainability of the very ecosystem we are all trying to save."[1]

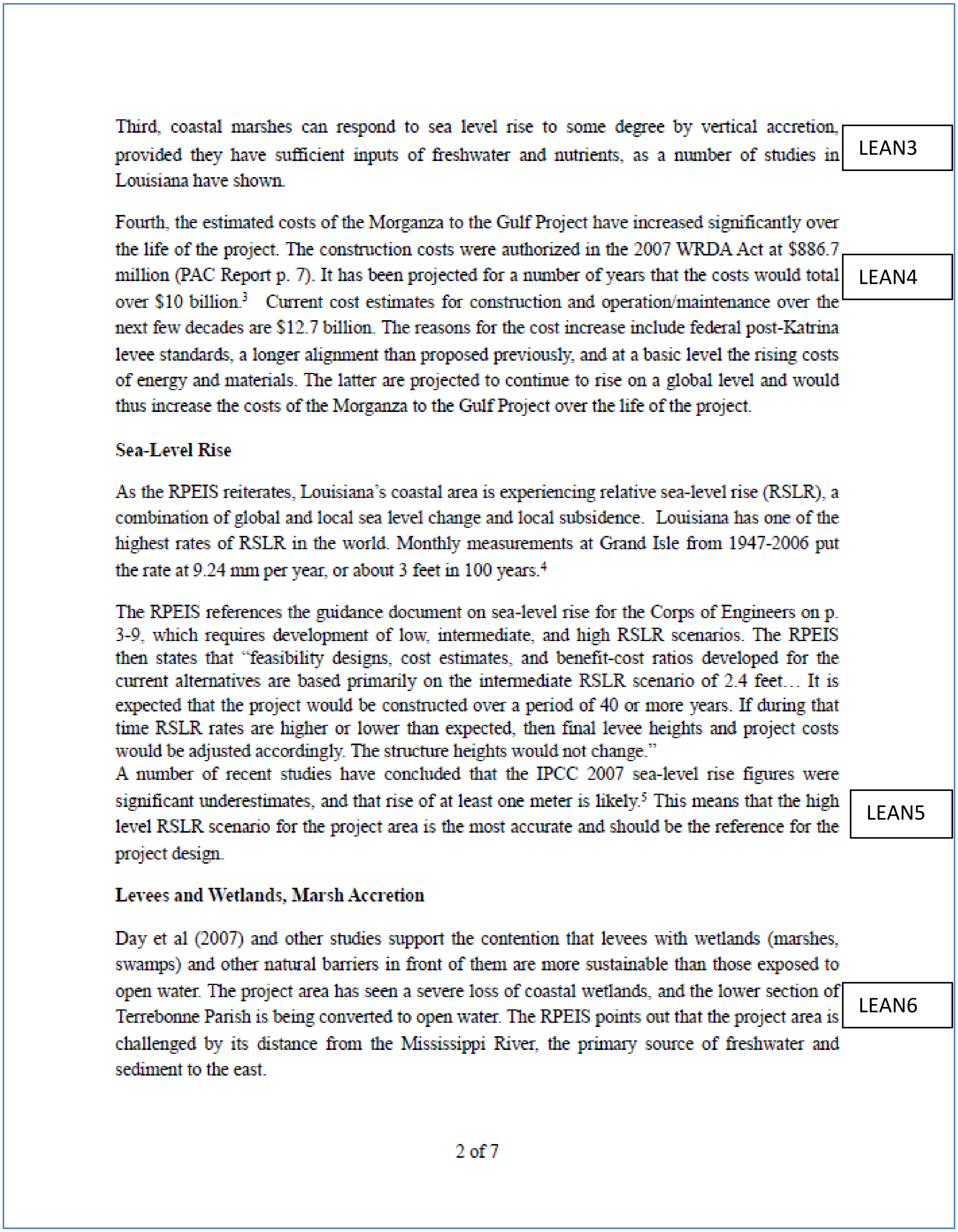
Our comments on this project are based on several core considerations.

First, sea level rise as a result of global warming is accelerating. The most recent scientific studies have concluded that at least one meter of sea level rise over the next century is likely.

LEAN1

Second, it has been clear since Hurricane Katrina that levees with wetlands and other natural barriers in front of them stand the best chance of surviving major storms, rather than levees in direct or near direct contact with open water. [2]

LEAN2



Third, coastal marshes can respond to sea level rise to some degree by vertical accretion, provided they have sufficient inputs of freshwater and nutrients, as a number of studies in Louisiana have shown.

LEAN3

Fourth, the estimated costs of the Morganza to the Gulf Project have increased significantly over the life of the project. The construction costs were authorized in the 2007 WRDA Act at $886.7 million (PAC Report p. 7). It has been projected for a number of years that the costs would total over $10 billion.[3] Current cost estimates for construction and operation/maintenance over the next few decades are $12.7 billion. The reasons for the cost increase include federal post-Katrina levee standards, a longer alignment than proposed previously, and at a basic level the rising costs of energy and materials. The latter are projected to continue to rise on a global level and would thus increase the costs of the Morganza to the Gulf Project over the life of the project.

LEAN4

Sea-Level Rise

As the RPEIS reiterates, Louisiana's coastal area is experiencing relative sea-level rise (RSLR), a combination of global and local sea level change and local subsidence. Louisiana has one of the highest rates of RSLR in the world. Monthly measurements at Grand Isle from 1947-2006 put the rate at 9.24 mm per year, or about 3 feet in 100 years.[4]

The RPEIS references the guidance document on sea-level rise for the Corps of Engineers on p. 3-9, which requires development of low, intermediate, and high RSLR scenarios. The RPEIS then states that "feasibility designs, cost estimates, and benefit-cost ratios developed for the current alternatives are based primarily on the intermediate RSLR scenario of 2.4 feet… It is expected that the project would be constructed over a period of 40 or more years. If during that time RSLR rates are higher or lower than expected, then final levee heights and project costs would be adjusted accordingly. The structure heights would not change."

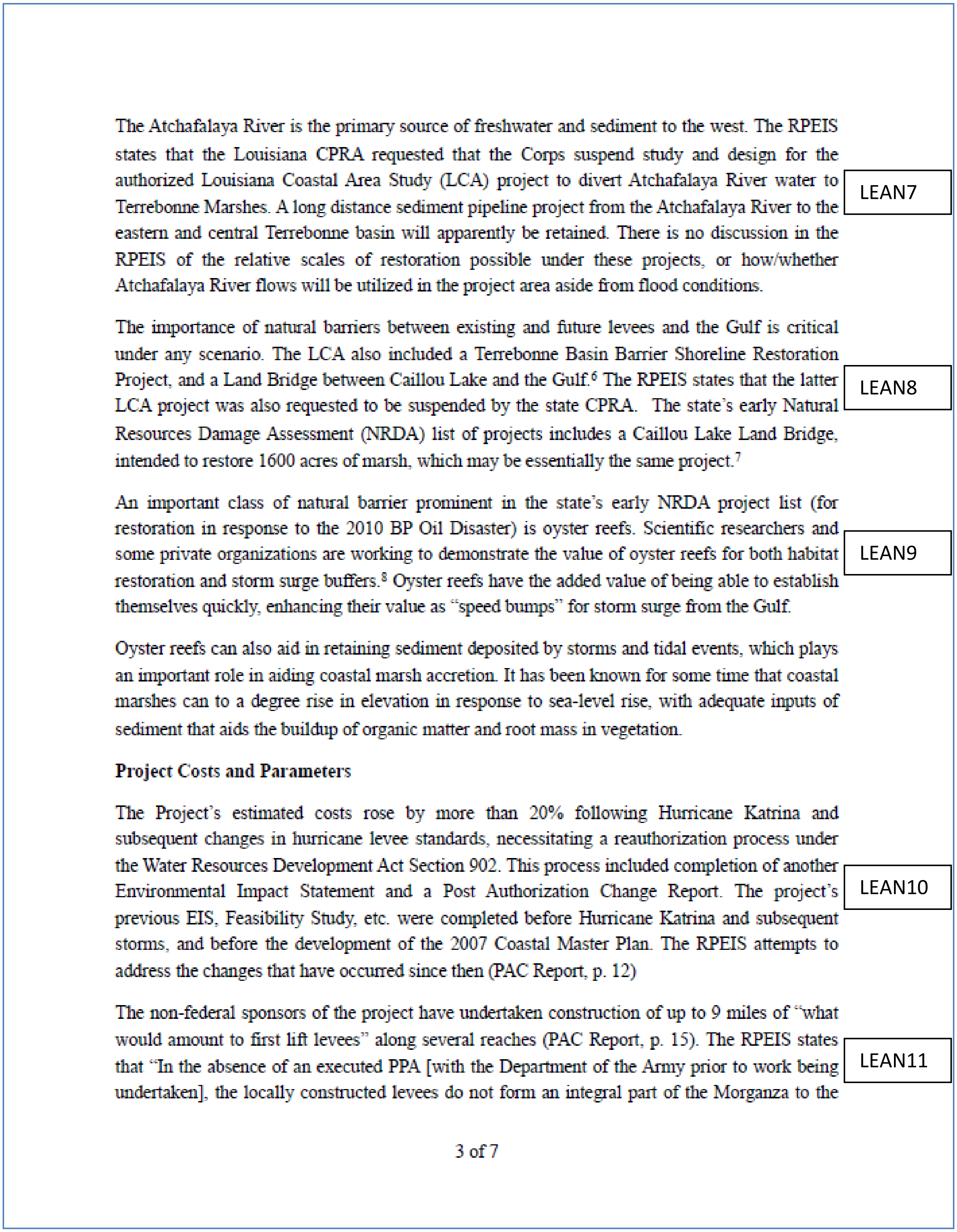
A number of recent studies have concluded that the IPCC 2007 sea-level rise figures were significant underestimates, and that rise of at least one meter is likely.[5] This means that the high level RSLR scenario for the project area is the most accurate and should be the reference for the project design.

LEAN5

Levees and Wetlands, Marsh Accretion

Day et al (2007) and other studies support the contention that levees with wetlands (marshes, swamps) and other natural barriers in front of them are more sustainable than those exposed to open water. The project area has seen a severe loss of coastal wetlands, and the lower section of Terrebonne Parish is being converted to open water. The RPEIS points out that the project area is challenged by its distance from the Mississippi River, the primary source of freshwater and sediment to the east.

LEAN6



The Atchafalaya River is the primary source of freshwater and sediment to the west. The RPEIS states that the Louisiana CPRA requested that the Corps suspend study and design for the authorized Louisiana Coastal Area Study (LCA) project to divert Atchafalaya River water to Terrebonne Marshes. A long distance sediment pipeline project from the Atchafalaya River to the eastern and central Terrebonne basin will apparently be retained. There is no discussion in the RPEIS of the relative scales of restoration possible under these projects, or how/whether Atchafalaya River flows will be utilized in the project area aside from flood conditions.

LEAN7

The importance of natural barriers between existing and future levees and the Gulf is critical under any scenario. The LCA also included a Terrebonne Basin Barrier Shoreline Restoration Project, and a Land Bridge between Caillou Lake and the Gulf.[6] The RPEIS states that the latter LCA project was also requested to be suspended by the state CPRA. The state's early Natural Resources Damage Assessment (NRDA) list of projects includes a Caillou Lake Land Bridge, intended to restore 1600 acres of marsh, which may be essentially the same project.[7]

LEAN8

An important class of natural barrier prominent in the state's early NRDA project list (for restoration in response to the 2010 BP Oil Disaster) is oyster reefs. Scientific researchers and some private organizations are working to demonstrate the value of oyster reefs for both habitat restoration and storm surge buffers.[8] Oyster reefs have the added value of being able to establish themselves quickly, enhancing their value as "speed bumps" for storm surge from the Gulf.

LEAN9

Oyster reefs can also aid in retaining sediment deposited by storms and tidal events, which plays an important role in aiding coastal marsh accretion. It has been known for some time that coastal marshes can to a degree rise in elevation in response to sea-level rise, with adequate inputs of sediment that aids the buildup of organic matter and root mass in vegetation.

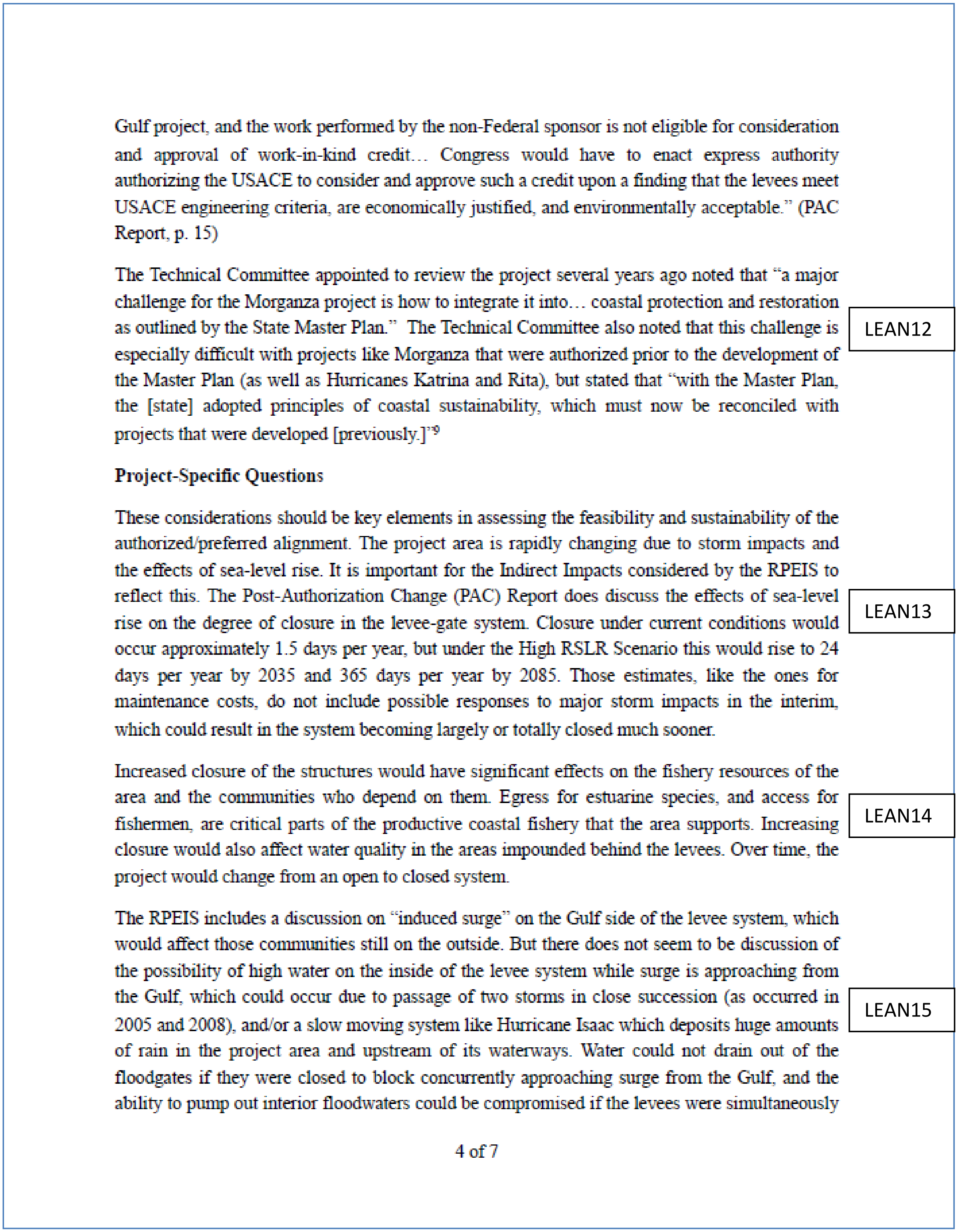
Project Costs and Parameters

The Project's estimated costs rose by more than 20% following Hurricane Katrina and subsequent changes in hurricane levee standards, necessitating a reauthorization process under the Water Resources Development Act Section 902. This process included completion of another Environmental Impact Statement and a Post Authorization Change Report. The project's previous EIS, Feasibility Study, etc. were completed before Hurricane Katrina and subsequent storms, and before the development of the 2007 Coastal Master Plan. The RPEIS attempts to address the changes that have occurred since then (PAC Report, p. 12)

LEAN10

The non-federal sponsors of the project have undertaken construction of up to 9 miles of "what would amount to first lift levees" along several reaches (PAC Report, p. 15). The RPEIS states that "In the absence of an executed PPA [with the Department of the Army prior to work being undertaken], the locally constructed levees do not form an integral part of the Morganza to the

LEAN11



Gulf project, and the work performed by the non-Federal sponsor is not eligible for consideration and approval of work-in-kind credit… Congress would have to enact express authority authorizing the USACE to consider and approve such a credit upon a finding that the levees meet USACE engineering criteria, are economically justified, and environmentally acceptable." (PAC Report, p. 15)

The Technical Committee appointed to review the project several years ago noted that "a major challenge for the Morganza project is how to integrate it into… coastal protection and restoration as outlined by the State Master Plan." The Technical Committee also noted that this challenge is especially difficult with projects like Morganza that were authorized prior to the development of the Master Plan (as well as Hurricanes Katrina and Rita), but stated that "with the Master Plan, the [state] adopted principles of coastal sustainability, which must now be reconciled with projects that were developed [previously.]"[9]

LEAN12

Project-Specific Questions

These considerations should be key elements in assessing the feasibility and sustainability of the authorized/preferred alignment. The project area is rapidly changing due to storm impacts and the effects of sea-level rise. It is important for the Indirect Impacts considered by the RPEIS to reflect this. The Post-Authorization Change (PAC) Report does discuss the effects of sea-level rise on the degree of closure in the levee-gate system. Closure under current conditions would occur approximately 1.5 days per year, but under the High RSLR Scenario this would rise to 24 days per year by 2035 and 365 days per year by 2085. Those estimates, like the ones for maintenance costs, do not include possible responses to major storm impacts in the interim, which could result in the system becoming largely or totally closed much sooner.

LEAN13

Increased closure of the structures would have significant effects on the fishery resources of the area and the communities who depend on them. Egress for estuarine species, and access for fishermen, are critical parts of the productive coastal fishery that the area supports. Increasing closure would also affect water quality in the areas impounded behind the levees. Over time, the project would change from an open to closed system.

LEAN14

The RPEIS includes a discussion on "induced surge" on the Gulf side of the levee system, which would affect those communities still on the outside. But there does not seem to be discussion of the possibility of high water on the inside of the levee system while surge is approaching from the Gulf, which could occur due to passage of two storms in close succession (as occurred in 2005 and 2008), and/or a slow moving system like Hurricane Isaac which deposits huge amounts of rain in the project area and upstream of its waterways. Water could not drain out of the floodgates if they were closed to block concurrently approaching surge from the Gulf, and the ability to pump out interior floodwaters could be compromised if the levees were simultaneously

LEAN15

overtopped. The likelihood of overtopping is an assumption of the project plan, since building levees to a height capable avoiding overtopping would be far more expensive.

The current plan calls for a series of lifts of substantial portions of the levee as they are constructed over the next few decades in response to subsidence, especially for the southernmost portions and those areas that cross marsh and open water in the authorized alignment. "To achieve levee design elevations at target years 2035 and 2085, each reach requires two or three additional lifts between approximately 2020 and 2070." (PAC Report, p. 57) This adds substantially to the project cost, and to the engineering challenge involved in building and raising these sections. As noted earlier, impacts from a major storm could necessitate substantial rebuilding of the levee, especially in the more exposed sections.

LEAN16

The RPEIS essentially considers only one alignment at different elevations (for the 1% and 3% AEP level of protection) and the "No Action" option. We are not convinced that the other option – the "Multiple Lines of Defense" (MLOD) alignment – has been adequately assessed, or that it has been too quickly dispensed with as less cost-effective, since the engineering and repair costs of the more southerly authorized alignment are likely to be higher than estimated due to the effects of sea-level rise and storms on construction and maintenance.

LEAN17

The MLOD 2008 Report proposed an alternative incorporating a series of ring levees and natural barriers outside the levees to increase their stability/resiliency, including marshes and cypress stands.[10] If increasing salinity levels render cypress stands unworkable, there has been substantial research at Louisiana universities on the expansion of black mangroves in the coastal zone and their utility as storm surge buffers.[11]

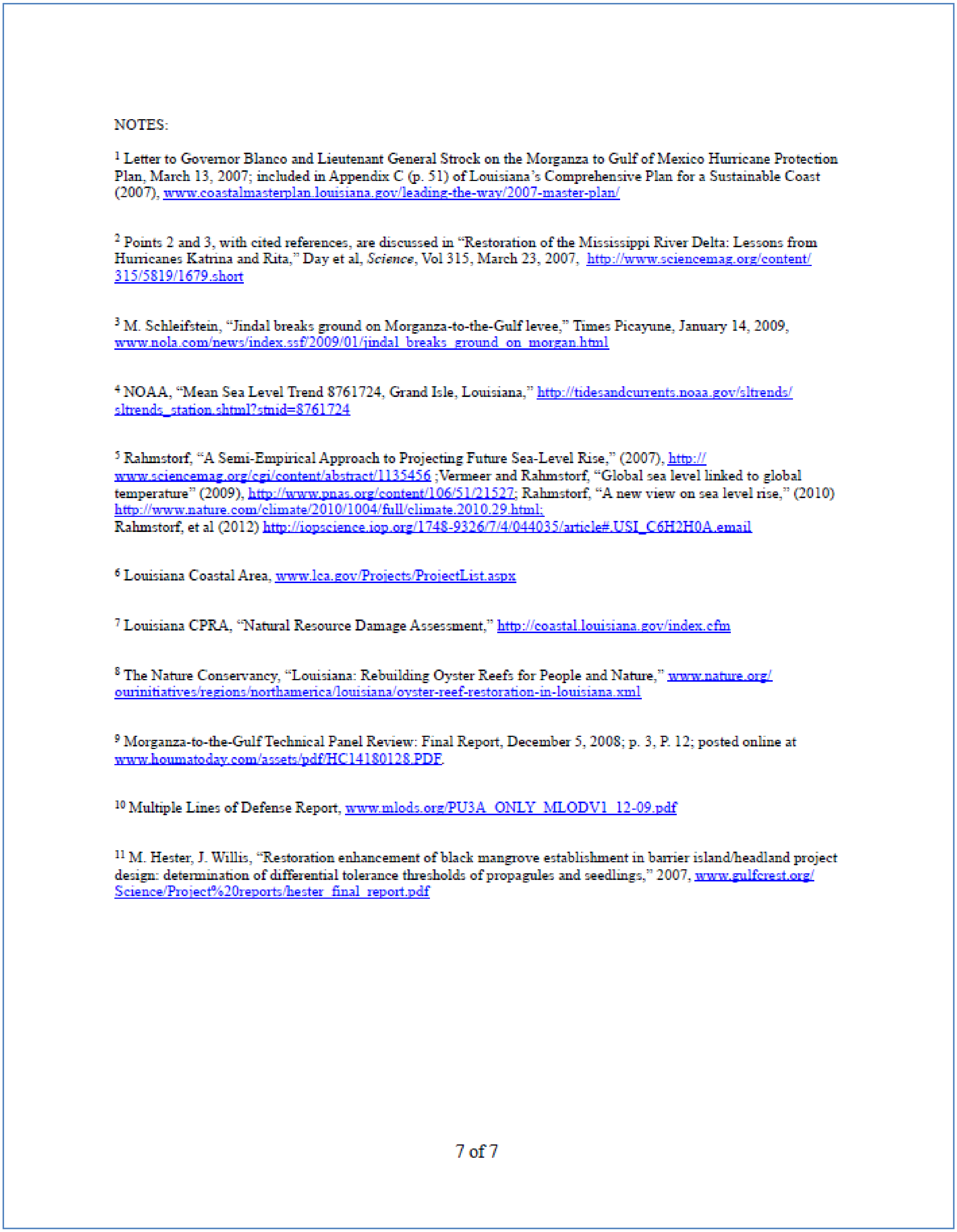
LEAN18

The driving motivation behind the current attempt at a rapid resolution of the long-standing questions about the Morganza to the Gulf Project is the need for the area's population centers and infrastructure to have effective hurricane protection. But the estimated 20 year-plus time frame for completion of the authorized alignment, along with its escalating costs, only serves to elevate the question of whether this option truly represents the best means of "protection" or effective risk reduction.

LEAN19

The need for protection is real and urgent enough to allow for a re-evaluation of alternatives and the potential for new combinations of actions that could provide that benefit in a more effective and timely manner, and that are more adaptable to the rapidly changing conditions in this part of Louisiana's coast.

LEAN20



NOTES:

[1] Letter to Governor Blanco and Lieutenant General Strock on the Morganza to Gulf of Mexico Hurricane Protection Plan, March 13, 2007; included in Appendix C (p. 51) of Louisiana's Comprehensive Plan for a Sustainable Coast (2007), www.coastalmasterplan.louisiana.gov/leading-the-way/2007-master-plan/

[2] Points 2 and 3, with cited references, are discussed in "Restoration of the Mississippi River Delta: Lessons from Hurricanes Katrina and Rita," Day et al, *Science*, Vol 315, March 23, 2007, http://www.sciencemag.org/content/315/5819/1679.short

[3] M. Schleifstein, "Jindal breaks ground on Morganza-to-the-Gulf levee," Times Picayune, January 14, 2009, www.nola.com/news/index.ssf/2009/01/jindal_breaks_ground_on_morgan.html

[4] NOAA, "Mean Sea Level Trend 8761724, Grand Isle, Louisiana," http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8761724

[5] Rahmstorf, "A Semi-Empirical Approach to Projecting Future Sea-Level Rise," (2007), http://www.sciencemag.org/cgi/content/abstract/1135456 ;Vermeer and Rahmstorf, "Global sea level linked to global temperature" (2009), http://www.pnas.org/content/106/51/21527; Rahmstorf, "A new view on sea level rise," (2010) http://www.nature.com/climate/2010/1004/full/climate.2010.29.html;
Rahmstorf, et al (2012) http://iopscience.iop.org/1748-9326/7/4/044035/article#.USI_C6H2H0A.email

[6] Louisiana Coastal Area, www.lca.gov/Projects/ProjectList.aspx

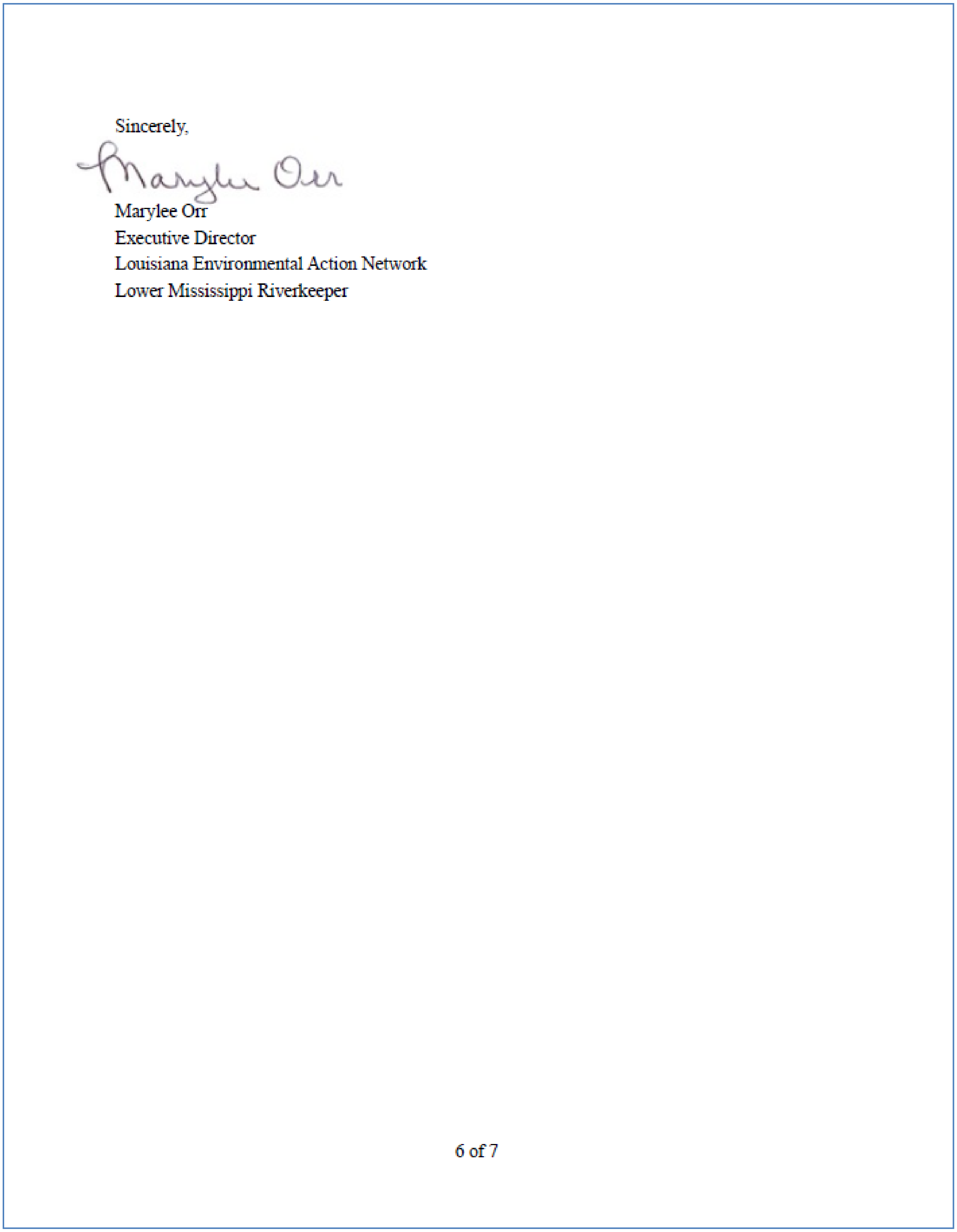
[7] Louisiana CPRA, "Natural Resource Damage Assessment," http://coastal.louisiana.gov/index.cfm

[8] The Nature Conservancy, "Louisiana: Rebuilding Oyster Reefs for People and Nature," www.nature.org/ourinitiatives/regions/northamerica/louisiana/oyster-reef-restoration-in-louisiana.xml

[9] Morganza-to-the-Gulf Technical Panel Review: Final Report, December 5, 2008; p. 3, P. 12; posted online at www.houmatoday.com/assets/pdf/HC14180128.PDF.

[10] Multiple Lines of Defense Report, www.mlods.org/PU3A_ONLY_MLODV1_12-09.pdf

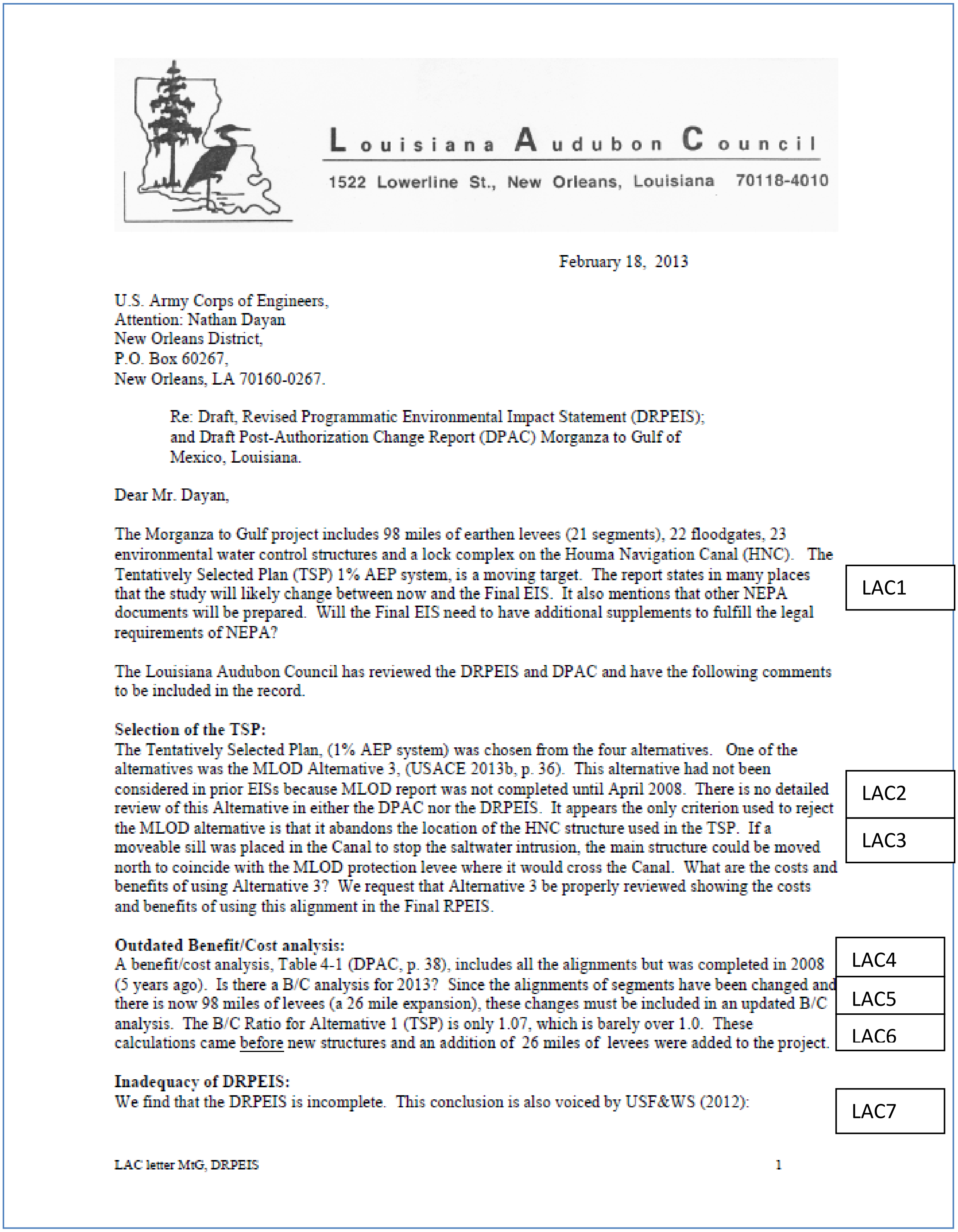
[11] M. Hester, J. Willis, "Restoration enhancement of black mangrove establishment in barrier island/headland project design: determination of differential tolerance thresholds of propagules and seedlings," 2007, www.gulfcrest.org/Science/Project%20reports/hester_final_report.pdf



Sincerely,

Marylee Orr

Marylee Orr
Executive Director
Louisiana Environmental Action Network
Lower Mississippi Riverkeeper



Louisiana Audubon Council
1522 Lowerline St., New Orleans, Louisiana 70118-4010

February 18, 2013

U.S. Army Corps of Engineers,
Attention: Nathan Dayan
New Orleans District,
P.O. Box 60267,
New Orleans, LA 70160-0267.

Re: Draft, Revised Programmatic Environmental Impact Statement (DRPEIS); and Draft Post-Authorization Change Report (DPAC) Morganza to Gulf of Mexico, Louisiana.

Dear Mr. Dayan,

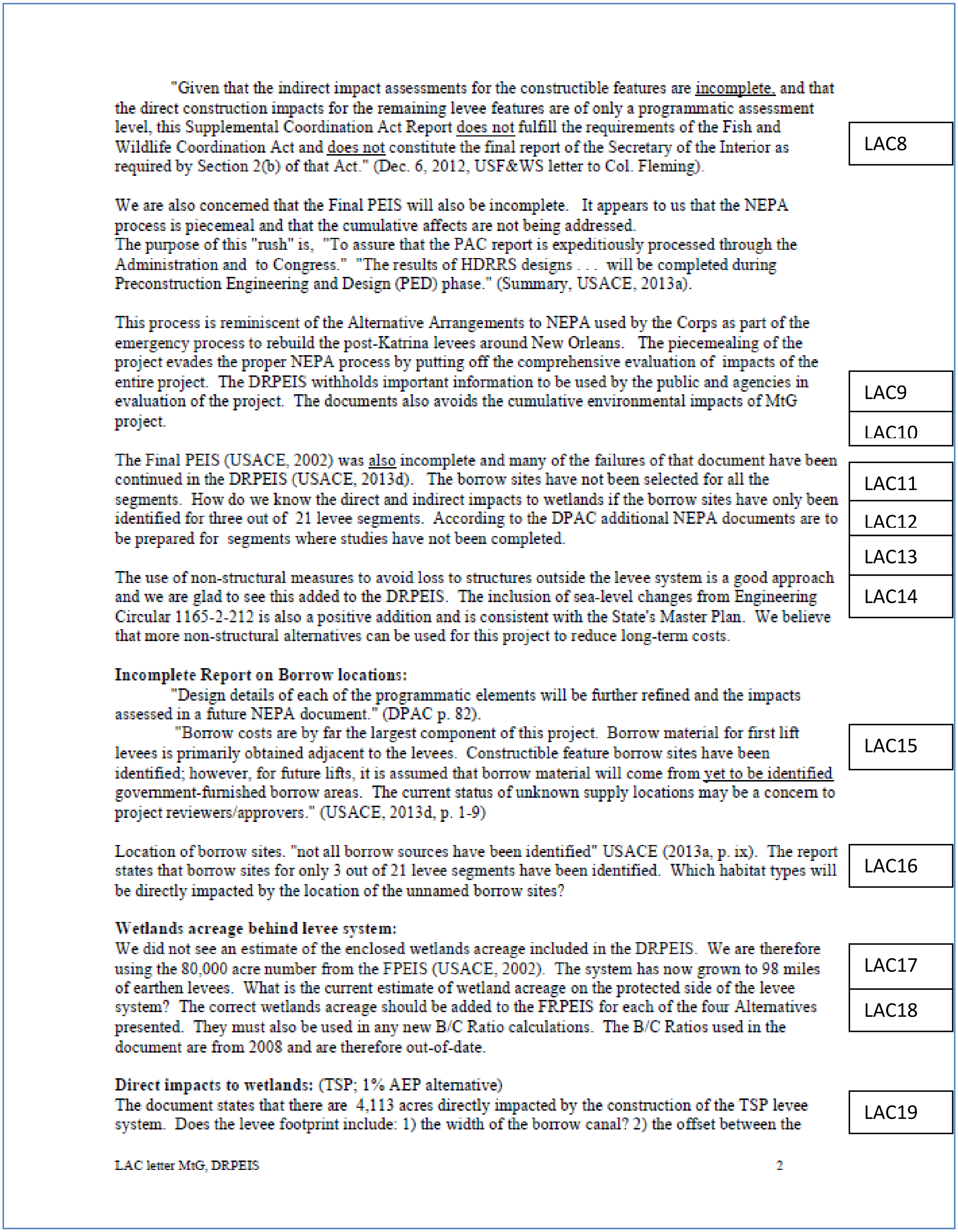
The Morganza to Gulf project includes 98 miles of earthen levees (21 segments), 22 floodgates, 23 environmental water control structures and a lock complex on the Houma Navigation Canal (HNC). The Tentatively Selected Plan (TSP) 1% AEP system, is a moving target. The report states in many places that the study will likely change between now and the Final EIS. It also mentions that other NEPA documents will be prepared. Will the Final EIS need to have additional supplements to fulfill the legal requirements of NEPA? LAC1

The Louisiana Audubon Council has reviewed the DRPEIS and DPAC and have the following comments to be included in the record.

Selection of the TSP:
The Tentatively Selected Plan, (1% AEP system) was chosen from the four alternatives. One of the alternatives was the MLOD Alternative 3, (USACE 2013b, p. 36). This alternative had not been considered in prior EISs because MLOD report was not completed until April 2008. There is no detailed review of this Alternative in either the DPAC nor the DRPEIS. LAC2 It appears the only criterion used to reject the MLOD alternative is that it abandons the location of the HNC structure used in the TSP. If a moveable sill was placed in the Canal to stop the saltwater intrusion, the main structure could be moved north to coincide with the MLOD protection levee where it would cross the Canal. LAC3 What are the costs and benefits of using Alternative 3? We request that Alternative 3 be properly reviewed showing the costs and benefits of using this alignment in the Final RPEIS.

Outdated Benefit/Cost analysis:
A benefit/cost analysis, Table 4-1 (DPAC, p. 38), includes all the alignments but was completed in 2008 (5 years ago). Is there a B/C analysis for 2013? LAC4 Since the alignments of segments have been changed and there is now 98 miles of levees (a 26 mile expansion), these changes must be included in an updated B/C analysis. LAC5 The B/C Ratio for Alternative 1 (TSP) is only 1.07, which is barely over 1.0. These calculations came <u>before</u> new structures and an addition of 26 miles of levees were added to the project. LAC6

Inadequacy of DRPEIS:
We find that the DRPEIS is incomplete. This conclusion is also voiced by USF&WS (2012): LAC7



"Given that the indirect impact assessments for the constructible features are incomplete, and that the direct construction impacts for the remaining levee features are of only a programmatic assessment level, this Supplemental Coordination Act Report does not fulfill the requirements of the Fish and Wildlife Coordination Act and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act." (Dec. 6, 2012, USF&WS letter to Col. Fleming).

LAC8

We are also concerned that the Final PEIS will also be incomplete. It appears to us that the NEPA process is piecemeal and that the cumulative affects are not being addressed.
The purpose of this "rush" is, "To assure that the PAC report is expeditiously processed through the Administration and to Congress." "The results of HDRRS designs . . . will be completed during Preconstruction Engineering and Design (PED) phase." (Summary, USACE, 2013a).

This process is reminiscent of the Alternative Arrangements to NEPA used by the Corps as part of the emergency process to rebuild the post-Katrina levees around New Orleans. The piecemealing of the project evades the proper NEPA process by putting off the comprehensive evaluation of impacts of the entire project. The DRPEIS withholds important information to be used by the public and agencies in evaluation of the project. The documents also avoids the cumulative environmental impacts of MtG project.

LAC9

LAC10

The Final PEIS (USACE, 2002) was also incomplete and many of the failures of that document have been continued in the DRPEIS (USACE, 2013d). The borrow sites have not been selected for all the segments. How do we know the direct and indirect impacts to wetlands if the borrow sites have only been identified for three out of 21 levee segments. According to the DPAC additional NEPA documents are to be prepared for segments where studies have not been completed.

LAC11

LAC12

LAC13

The use of non-structural measures to avoid loss to structures outside the levee system is a good approach and we are glad to see this added to the DRPEIS. The inclusion of sea-level changes from Engineering Circular 1165-2-212 is also a positive addition and is consistent with the State's Master Plan. We believe that more non-structural alternatives can be used for this project to reduce long-term costs.

LAC14

Incomplete Report on Borrow locations:

"Design details of each of the programmatic elements will be further refined and the impacts assessed in a future NEPA document." (DPAC p. 82).

"Borrow costs are by far the largest component of this project. Borrow material for first lift levees is primarily obtained adjacent to the levees. Constructible feature borrow sites have been identified; however, for future lifts, it is assumed that borrow material will come from yet to be identified government-furnished borrow areas. The current status of unknown supply locations may be a concern to project reviewers/approvers." (USACE, 2013d, p. 1-9)

LAC15

Location of borrow sites. "not all borrow sources have been identified" USACE (2013a, p. ix). The report states that borrow sites for only 3 out of 21 levee segments have been identified. Which habitat types will be directly impacted by the location of the unnamed borrow sites?

LAC16

Wetlands acreage behind levee system:

We did not see an estimate of the enclosed wetlands acreage included in the DRPEIS. We are therefore using the 80,000 acre number from the FPEIS (USACE, 2002). The system has now grown to 98 miles of earthen levees. What is the current estimate of wetland acreage on the protected side of the levee system? The correct wetlands acreage should be added to the FRPEIS for each of the four Alternatives presented. They must also be used in any new B/C Ratio calculations. The B/C Ratios used in the document are from 2008 and are therefore out-of-date.

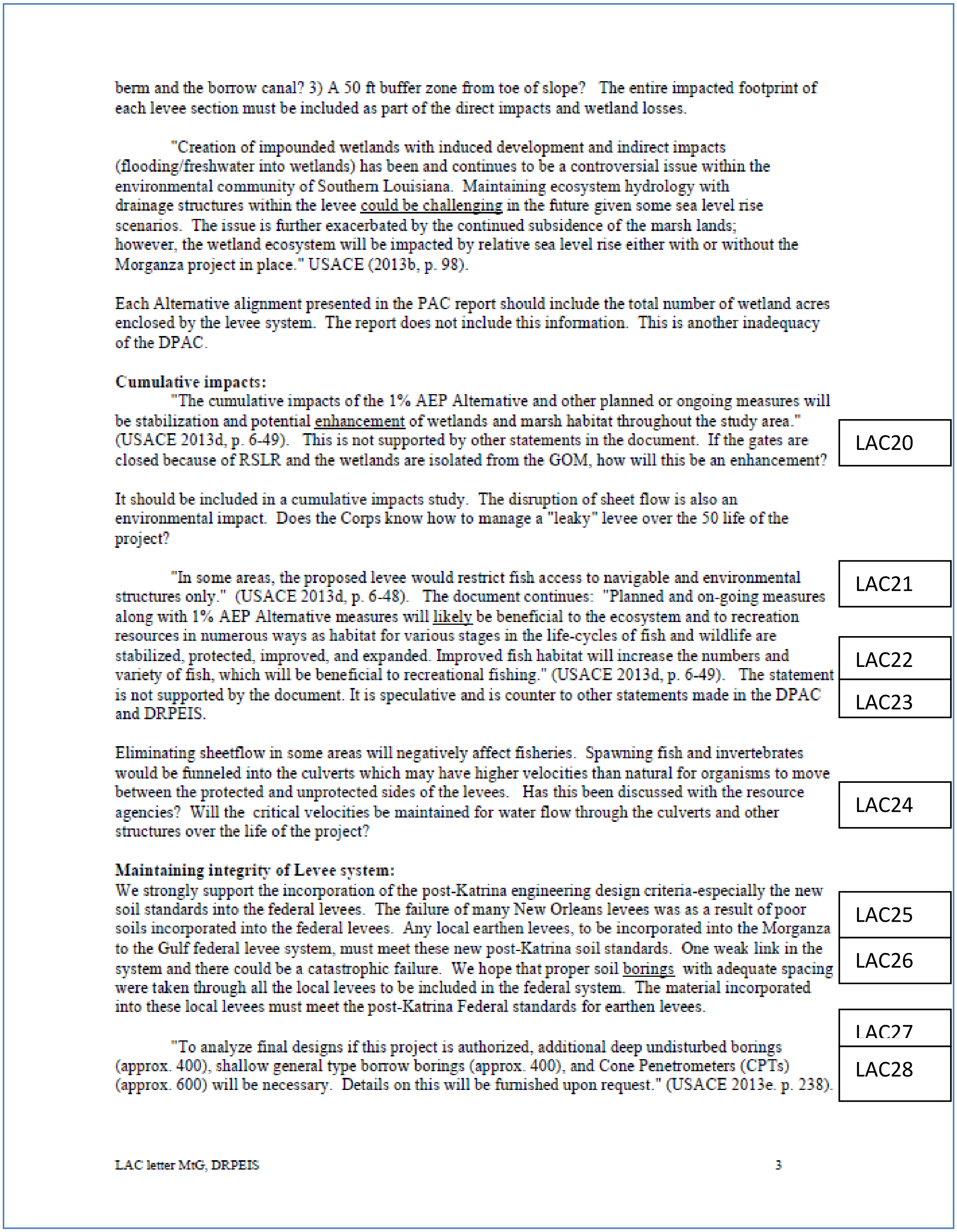
LAC17

LAC18

Direct impacts to wetlands: (TSP; 1% AEP alternative)

The document states that there are 4,113 acres directly impacted by the construction of the TSP levee system. Does the levee footprint include: 1) the width of the borrow canal? 2) the offset between the

LAC19



berm and the borrow canal? 3) A 50 ft buffer zone from toe of slope? The entire impacted footprint of each levee section must be included as part of the direct impacts and wetland losses.

"Creation of impounded wetlands with induced development and indirect impacts (flooding/freshwater into wetlands) has been and continues to be a controversial issue within the environmental community of Southern Louisiana. Maintaining ecosystem hydrology with drainage structures within the levee could be challenging in the future given some sea level rise scenarios. The issue is further exacerbated by the continued subsidence of the marsh lands; however, the wetland ecosystem will be impacted by relative sea level rise either with or without the Morganza project in place." USACE (2013b, p. 98).

Each Alternative alignment presented in the PAC report should include the total number of wetland acres enclosed by the levee system. The report does not include this information. This is another inadequacy of the DPAC.

Cumulative impacts:

"The cumulative impacts of the 1% AEP Alternative and other planned or ongoing measures will be stabilization and potential enhancement of wetlands and marsh habitat throughout the study area." (USACE 2013d, p. 6-49). This is not supported by other statements in the document. If the gates are closed because of RSLR and the wetlands are isolated from the GOM, how will this be an enhancement?

LAC20

It should be included in a cumulative impacts study. The disruption of sheet flow is also an environmental impact. Does the Corps know how to manage a "leaky" levee over the 50 life of the project?

"In some areas, the proposed levee would restrict fish access to navigable and environmental structures only." (USACE 2013d, p. 6-48). The document continues: "Planned and on-going measures along with 1% AEP Alternative measures will likely be beneficial to the ecosystem and to recreation resources in numerous ways as habitat for various stages in the life-cycles of fish and wildlife are stabilized, protected, improved, and expanded. Improved fish habitat will increase the numbers and variety of fish, which will be beneficial to recreational fishing." (USACE 2013d, p. 6-49). The statement is not supported by the document. It is speculative and is counter to other statements made in the DPAC and DRPEIS.

LAC21

LAC22

LAC23

Eliminating sheetflow in some areas will negatively affect fisheries. Spawning fish and invertebrates would be funneled into the culverts which may have higher velocities than natural for organisms to move between the protected and unprotected sides of the levees. Has this been discussed with the resource agencies? Will the critical velocities be maintained for water flow through the culverts and other structures over the life of the project?

LAC24

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 as a result of poor soils incorporated into the federal levees. Any local earthen levees, to be incorporated into the Morganza to the Gulf federal levee system, must meet these new post-Katrina soil standards. One weak link in the system and there could be a catastrophic failure. We hope that proper soil borings with adequate spacing were taken through all the local levees to be included in the federal system. The material incorporated into these local levees must meet the post-Katrina Federal standards for earthen levees.

LAC25

LAC26

"To analyze final designs if this project is authorized, additional deep undisturbed borings (approx. 400), shallow general type borrow borings (approx. 400), and Cone Penetrometers (CPTs) (approx. 600) will be necessary. Details on this will be furnished upon request." (USACE 2013e. p. 238).

LAC27

LAC28

The detailed soil borings have not yet been taken. The data from these borings may alter the design or placement of some levee sections. We are surprised that these geological/engineering data have not been collected yet.

Impacts to fisheries and marshes by a "leaky" levee system:
We do criticize the inclusion of over 80,000 acres (125 sq mi) of wetlands within the federal "leaky" levee system. If MLOD Alternative were used, many of the issues would be moot. There are several issues of concern related to this vast acreage:

First, the wetlands will be isolated from storm surges which carry suspended sediments. It has been shown that suspended sediments distributed inland by storms and cold fronts are part of the natural process of wetlands nourishment (Roberts etal, 2012). Marshes can be sustained by only millimeters of suspended mineral sediments deposited annually. Without this influx of suspended sediments, the marsh will continue to subside, drowning the marsh, thus turning the enclosed area into open water. We request that the Corps and other agencies look at this process before agreeing to enclose and isolate 80,000 acres of wetlands. What are the environmental costs if these marshes are lost to productivity? This is a scenario which should be considered. LAC30

Second, the isolation of the wetlands over time will reduce the fisheries productivity in Terrebonne Parish. Fisheries species need unimpeded access to the interior fresh and intermediate marshes for spawning and juvenile growth. Will the number of culverts and navigational openings be sufficient over the 50 year life of the project to assure ingress and egress of fisheries species? This was not adequately discussed in the RPEIS. Will the openings compensate for the elimination of sheet flow? LAC32

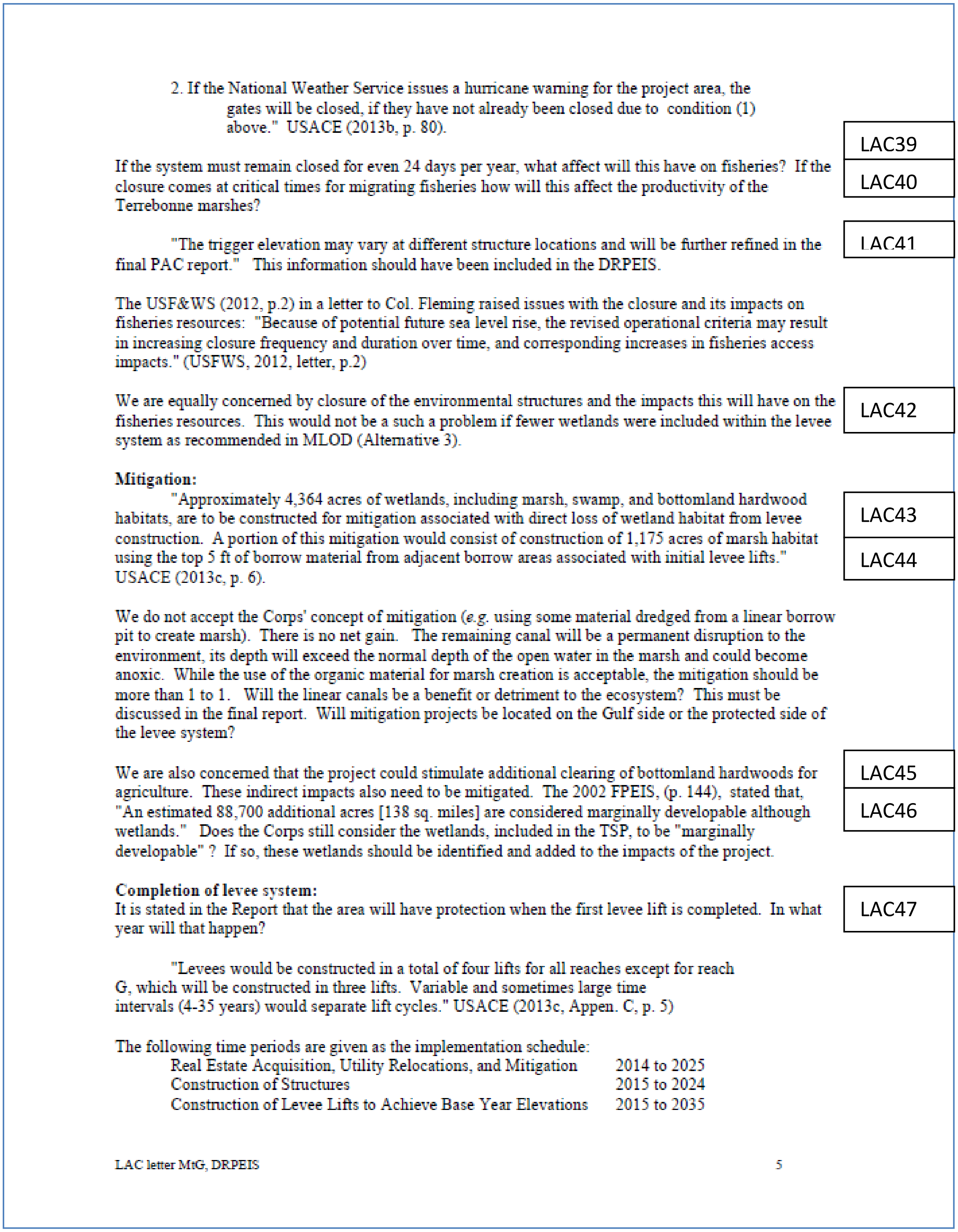
Third, we also have concerns about the sustainability of the 6x6 ft culverts which will cross under the levees. Because of high subsidence rates where the levees cross marshes (especially Reaches J, K, L), how will the Corps assure that water circulation will be maintained as these levee segments subside? The elevation of some segments are to be are to be built to presettlement elevations of 28 ft. There are many examples of highway embankments in which culverts were installed to maintain water circulation. These failed to provide normal hydrology over the life of the project because subsidence of the embankment and filling in of the culverts. LAC34

Will the culverts be built on pilings? How will the cross sectional areas be maintained over the life of the project? As RSLR increases, how will this affect the movement of water through the culverts over the life of the project? LAC36 LAC37

Fourth, the PREIS states that because of Relative Sea Level Rise (RSLR), the openings in the levee system will have to close if the water levels reach +2.5 ft. It is stated that:

> "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).

> "Environmental control structures will be closed for storm surge control if:
>
> 1. The water surface elevation on the staff gage reaches +2.5 feet NAVD88 at the flood gates when there is a named tropical storm in the Gulf.



2. If the National Weather Service issues a hurricane warning for the project area, the gates will be closed, if they have not already been closed due to condition (1) above." USACE (2013b, p. 80).

If the system must remain closed for even 24 days per year, what affect will this have on fisheries? If the closure comes at critical times for migrating fisheries how will this affect the productivity of the Terrebonne marshes?

LAC39

LAC40

"The trigger elevation may vary at different structure locations and will be further refined in the final PAC report." This information should have been included in the DRPEIS.

LAC41

The USF&WS (2012, p.2) in a letter to Col. Fleming raised issues with the closure and its impacts on fisheries resources: "Because of potential future sea level rise, the revised operational criteria may result in increasing closure frequency and duration over time, and corresponding increases in fisheries access impacts." (USFWS, 2012, letter, p.2)

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 in MLOD (Alternative 3).

LAC42

Mitigation:

"Approximately 4,364 acres of wetlands, including marsh, swamp, and bottomland hardwood habitats, are to be constructed for mitigation associated with direct loss of wetland habitat from levee construction. A portion of this mitigation would consist of construction of 1,175 acres of marsh habitat using the top 5 ft of borrow material from adjacent borrow areas associated with initial levee lifts." USACE (2013c, p. 6).

LAC43

LAC44

We do not accept the Corps' concept of mitigation (*e.g.* using some material dredged from a linear borrow pit to create marsh). There is no net gain. The remaining canal will be a permanent disruption to the environment, its depth will exceed the normal depth of the open water in the marsh and could become anoxic. While the use of the organic material for marsh creation is acceptable, the mitigation should be more than 1 to 1. Will the linear canals be a benefit or detriment to the ecosystem? This must be discussed in the final report. Will mitigation projects be located on the Gulf side or the protected side of the levee system?

We are also concerned that the project could stimulate additional clearing of bottomland hardwoods for agriculture. These indirect impacts also need to be mitigated. The 2002 FPEIS, (p. 144), stated that, "An estimated 88,700 additional acres [138 sq. miles] are considered marginally developable although wetlands." Does the Corps still consider the wetlands, included in the TSP, to be "marginally developable" ? If so, these wetlands should be identified and added to the impacts of the project.

LAC45

LAC46

Completion of levee system:

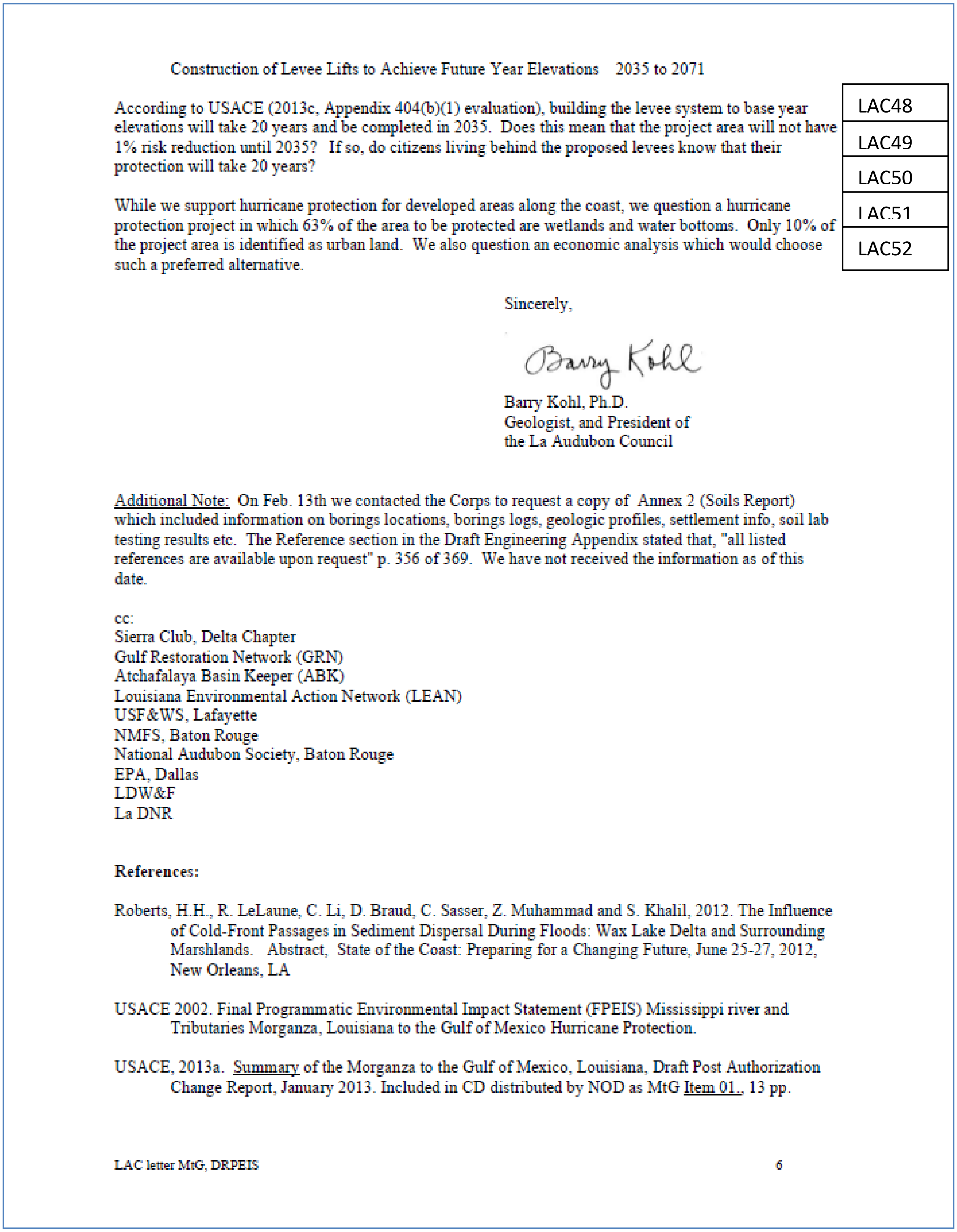
It is stated in the Report that the area will have protection when the first levee lift is completed. In what year will that happen?

LAC47

"Levees would be constructed in a total of four lifts for all reaches except for reach G, which will be constructed in three lifts. Variable and sometimes large time intervals (4-35 years) would separate lift cycles." USACE (2013c, Appen. C, p. 5)

The following time periods are given as the implementation schedule:

Real Estate Acquisition, Utility Relocations, and Mitigation	2014 to 2025
Construction of Structures	2015 to 2024
Construction of Levee Lifts to Achieve Base Year Elevations	2015 to 2035



Construction of Levee Lifts to Achieve Future Year Elevations 2035 to 2071

LAC48
LAC49
LAC50
LAC51
LAC52

According to USACE (2013c, Appendix 404(b)(1) evaluation), building the levee system to base year elevations will take 20 years and be completed in 2035. Does this mean that the project area will not have 1% risk reduction until 2035? If so, do citizens living behind the proposed levees know that their protection will take 20 years?

While we support hurricane protection for developed areas along the coast, we question a hurricane protection project in which 63% of the area to be protected are wetlands and water bottoms. Only 10% of the project area is identified as urban land. We also question an economic analysis which would choose such a preferred alternative.

Sincerely,

Barry Kohl

Barry Kohl, Ph.D.
Geologist, and President of
the La Audubon Council

<u>Additional Note:</u> On Feb. 13th we contacted the Corps to request a copy of Annex 2 (Soils Report) which included information on borings locations, borings logs, geologic profiles, settlement info, soil lab testing results etc. The Reference section in the Draft Engineering Appendix stated that, "all listed references are available upon request" p. 356 of 369. We have not received the information as of this date.

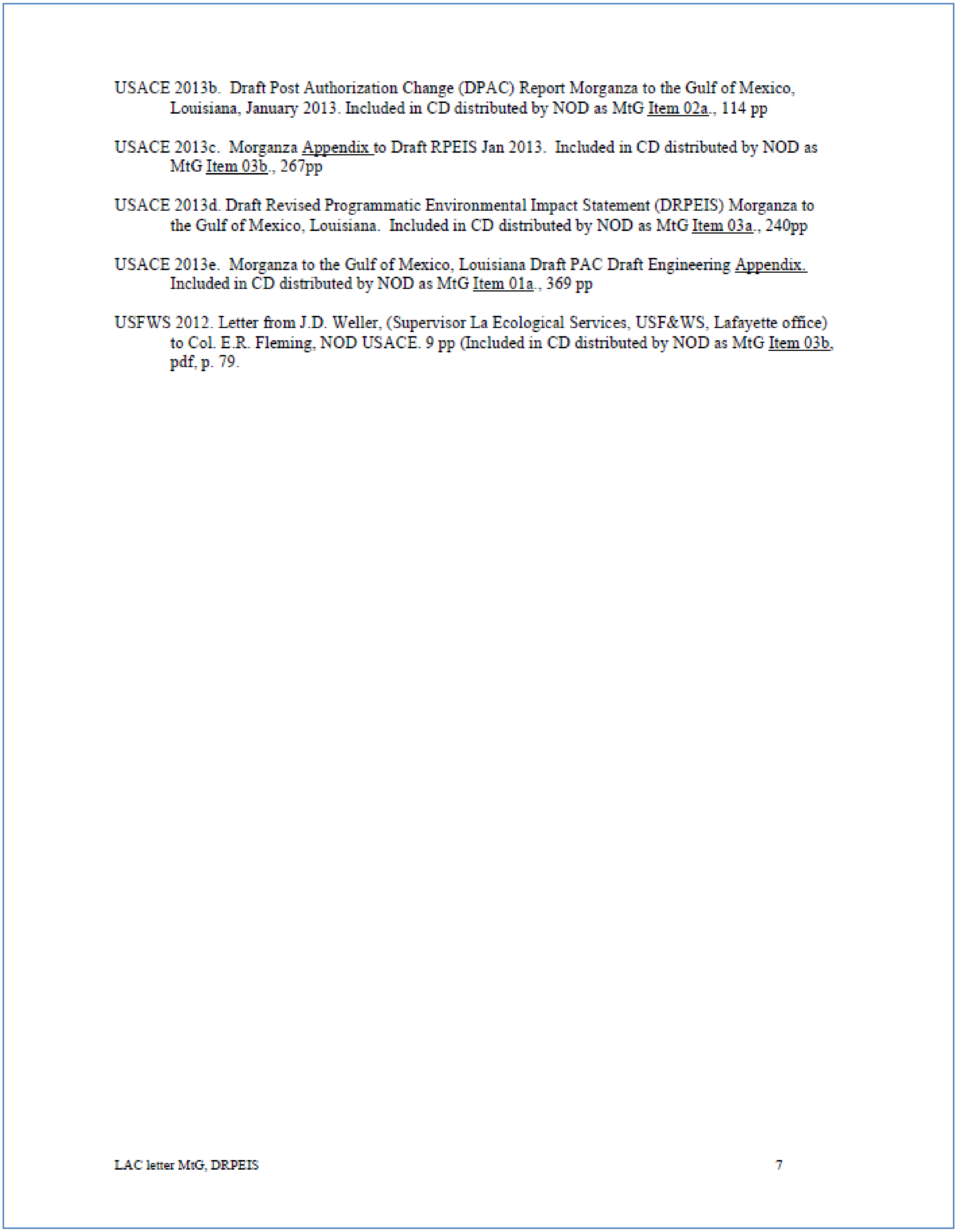
cc:
Sierra Club, Delta Chapter
Gulf Restoration Network (GRN)
Atchafalaya Basin Keeper (ABK)
Louisiana Environmental Action Network (LEAN)
USF&WS, Lafayette
NMFS, Baton Rouge
National Audubon Society, Baton Rouge
EPA, Dallas
LDW&F
La DNR

References:

Roberts, H.H., R. LeLaune, C. Li, D. Braud, C. Sasser, Z. Muhammad and S. Khalil, 2012. The Influence of Cold-Front Passages in Sediment Dispersal During Floods: Wax Lake Delta and Surrounding Marshlands. Abstract, State of the Coast: Preparing for a Changing Future, June 25-27, 2012, New Orleans, LA

USACE 2002. Final Programmatic Environmental Impact Statement (FPEIS) Mississippi river and Tributaries Morganza, Louisiana to the Gulf of Mexico Hurricane Protection.

USACE, 2013a. <u>Summary</u> of the Morganza to the Gulf of Mexico, Louisiana, Draft Post Authorization Change Report, January 2013. Included in CD distributed by NOD as MtG <u>Item 01.</u>, 13 pp.



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. Morganza Appendix to Draft RPEIS Jan 2013. Included in CD distributed by NOD as MtG Item 03b., 267pp

USACE 2013d. Draft Revised Programmatic Environmental Impact Statement (DRPEIS) Morganza to the Gulf of Mexico, Louisiana. Included in CD distributed by NOD as MtG Item 03a., 240pp

USACE 2013e. Morganza to the Gulf of Mexico, Louisiana Draft PAC Draft Engineering Appendix. Included in CD distributed by NOD as MtG Item 01a., 369 pp

USFWS 2012. Letter from J.D. Weller, (Supervisor La Ecological Services, USF&WS, Lafayette office) to Col. E.R. Fleming, NOD USACE. 9 pp (Included in CD distributed by NOD as MtG Item 03b, pdf, p. 79.

GULF RESTORATION NETWORK
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Phone: 504.525.1528 Fax: 504.525.0833

18 February, 2013

Nathan Dayan
United States Army Corps of Engineers
New Orleans District
PO Box 60267
New Orleans, LA 70160-0267
Nathan.S.Dayan@usace.army.mil

Re: Draft, Revised Programmatic Environmental Impact Statement (DRPEIS) and Draft Post-Authorization Change Report (DPAC), Morganza to Gulf Project

Dear Mr. Dayan:

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. We have serious concerns about the ability of project to protect life and property within the project area.

GULF1

GULF2

GULF3

The basis of our concerns lies in the deviation of the preferred alignment from a 'Lines of Defense' strategy taken elsewhere on the Louisiana coast. Given the ongoing loss of land and displacement of population within and from our region, this strategy was written to protect human life and property from storm surge threat while striking the balance necessary to maintain the ecosystem services that sustain coastal lifeways and economies. A Lines of Defense strategy allows for and entails the restoration and re-integration of protective coastal processes and features such as land-building and land-sustaining river floods, forested ridges, large expanses of interior and exterior marsh wetlands, and barrier islands--while planning for elevation and floodproofing of homes behind protective features, as well as planning for regular evacuation events. A lines-of-defense strategy also includes planning for relocation of distal coastal communities when and where it is necessary, so that coastal cultures can be maintained wherever possible.

It is this strategy that has heavily influenced the Louisiana 2012 Coastal Master Plan.

GULF4

The outward alignment selected as the preferred alternative has a long history, and was chosen before the latest science on the subsidence within the project area was as well understood. The preferred alignment is an alignment designed with "erosion," or loss of wetlands from the distal end of the basin inward, as the primary mechanism of coastal land loss; it is now understood that subsidence is the primary geological mechanism by which the interior marshes have been lost and the primary threat to the land within the project area in the future. In addition to this new understanding, we have learned more about the negative effects of impounding wetlands behind levees and roads from this very project area.[1] New research[2] also suggests that regular tidal fronts can deposit a non-trival amount of sediment into connected coastal marshes, giving even more credence to the MLOD strategy of leaving estuarine systems connected for flood risk reduction, and thus striking a balance between flood protection and a sustainable ecosystem.

GULF5

GULF6

Rather than strike this balance, the preferred alignment extends a barrier against the sea far out into the estuary. And so, the levee alignment extends through open water areas for much of its length. In order to compensate for this large alteration in hydrology, the alignment contains flood gates that allow the exchange of tidal waters so long as they remain open. It is very likely that the changes in sea level rise will ensure that the gates will be increasingly closed, until, as sea level rises above 2.5 feet + NAVD, the gates will remain permanently closed.

GULF7

The increasing, then permanent closure of these gates will not only weaken the remnant or restored wetlands in this area, but also inhibit and then restrict the water-dependent economic activity which sustains the coastal communities resident in the areas to be protected.

GULF8

More immediately, the project as proposed would mislead the public into a presumption of flood protection for the intervening period before the base date of 2035 or the settlement of the final lifts in 2085.

Based upon these considerations, our comments are as follows:

1) **There are insufficient funds authorized for non –structural measures and relocation.**

GULF9

Given that the purpose of this project is 1% flood risk reduction, and that flooding of the area by is likely between 2012 and 2035, or between 2012 and 2085, it is within the scope of the project to consider elevation and floodproofing of structures, and relocation for populations within the project area as well as without. Currently, there are only relocation plans for populations without the preferred alignment that will receive induced surge.

Authorization for non-structural and relocation dollars should include a broader swath of the populated area, including not only the communities of Gibson, Bayou Du Large, Dulac, Cocodrie, and Isle de Jean Charles; but also the communities of Montegut, Point Aux Chenes, Chauvin, Boudreaux, and Theriot.

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[1] See Appendix A, *Comments on Falgout Canal*

[2] H.H. Roberts et al. 2012, presented to State of the Coast. *The Influence of Cold-Front Passages in Sediment Dispersal During floods*

Internal displacement from the chronic degradation of the land, from chronic social issues, from repeated storms, and from changes in federal flood insurance is already causing a disorganized population migration away from these areas of coast (RPEIS, 5-44).

GULF10

In order to maintain cultural values and access, a lines of defense strategy, as embodied in the 2012 Master Plan, allocates a quarter of total protection and restoration funding to "non-structural" measures within and without the levee system.

GULF11

Authorization of these funds for reduction of flood risk would communicate the risk of flooding in the more distal areas of the basin, and without these more distal communities being considered for floodproofing and relocation, the Army Corps risks misleading coastal communities that they will be protected from the project storm.

GULF12

Among the listed communities in the real estate plan appendix, the Isle de Jean Charles community is not included, despite its inclusion in other areas of the RPEIS because of the fact that that community will receive induced surge from the predicted alignment. *The absence of Isle de Jean Charles in the Real Estate Appendix is an error and does not give us confidence that the Executive Order on Environmental Justice (E.O. 12898) is being taken seriously*.

GULF13

We request that funds for non-structural risk reduction be authorized within the project area, as well as relocation funds for more distal areas of the basin.

2) Lack of consideration of updates to the DFIRM and Biggert-Waters Reform Act of 2012

GULF14

Although the population projections for the project area are projected to rise overall, the analysis of population growth within the basin does not distinguish between the areas more proximal to the Mississippi River, which are growing in population, and the distal areas, where people are leaving (RPEIS, 5-44). This pattern reflects a general trend across the coast.

Parishes along the coast have recently seen or will see in the future, large changes to federal flood insurance rates. Across Louisiana coastal communities, flood insurance rates are the major talk of the day, and will likely influence the current intra-basin migration up the bayou.

We question any population analysis that ignores the changes in federal insurance, as well as the existing intra-basin trend of population growth. We request an economic benefits analysis that includes these geographic details.

3) Lack of consideration of existing and future ring levees

GULF15

It is stated at the Alternative 3 alignment for the Morganza to the Gulf Project, the MLOD or "lines of defense" alignment, has a larger footprint upon bottomland hardwood forest habitat. But this RPEIS does not consider the environmental impact of the other existing and proposed levees necessitated by flood risk reduction.

Additionally, several additional ring levees have been noticed through the 404 permitting process for the area north of Lake Boudreaux that would directly and indirectly impact the bottomland hardwood habitat in the area.

We argue that these ring levees, which in places rise to the heights of the first lift of the Morganza project, are a de-facto Alternative 3 being built in addition to the preferred alternative, and so these damages to habitat are proposed in addition to the damages of the preferred alignment.

GULF16

As the MLOD report was completed in 2008, after previous EIS efforts, and before the project-specific design proposals for these ring levees, it is unknown whether an Alternative 3 alignment would have larger forest impact.

GULF17

Although many modifications of the preferred alternative have been made to adjust for impacts, the same rigor has not been applied to Alternative 3.

GULF18

We request that the full levee system, including ring levees, within the project area be evaluated for environmental impacts.

GULF19

We request a full analysis of Alternative 3 based upon the ring levees proposed for the area.

4) Mitigation of public lands should take place within the bounds of public lands

Given the low proportion of public lands in coastal Louisiana, damages to what few public areas exist are damages to public recreation and aesthetic enjoyment.

Specifically, Impacts to Mandalay National Wildlife Refuge should take place within the bounds of that Refuge; impacts to Point Aux Chenes WMA should also take place within the bounds of that area. Both areas have been heavily impacted by legacy oil and gas activity. Mandalay has more potential for the backfilling of inactive oil and gas canals, and flotant marsh restoration; Point Aux Chenes WMA is heavily impacted by industry to the point that marsh creation with outside sediments must occur for restoration.

GULF20

Restoration of both of these areas would provide flood risk reduction to communities within the project area, as well as reduce the likelihood of damage from regular storm fronts to the project structures themselves, lowering maintenance costs.

We request that mitigation for Mandalay NWR and Point Aux Chenes WMA occur within the bounds and management of those areas.

5) The levee system should be mitigated for with the most current mitigation standard.

GULF21

In our previous letters, we have written about the general lack of mitigation plans available for comment concurrent with project authorization.[3]

We have also written about the general failure of mitigation to replace ecological function.[4]

In the New Orleans District, both in regulatory and civil works departments, mitigation for damages generally occurs in basins proximal to the Mississippi River, and thus the mitigation program generally aids the retreat from the coast, degrading vulnerable distal watersheds and leaving coastal areas more vulnerable to storm surges.

This specific project area once contained a "marsh management" mitigation project, Fina La Terre, that was ruled invalid because the impoundment of wetlands behind levees and roads led to lowered accretion of marshes, and thus weaker marsh roots.[5]

We request that the highest mitigation standard be applied to this public project, and that floodside mitigation be included at every possibility.

GULF22

It is troubling that this misunderstanding of coastal processes is reflected in the fact that this preferred alignment for the Morganza to the Gulf levee follows the footprint of several failed "marsh management" structures.

We reserve the right to rely on other comments submitted for this EIS.

For a healthy Gulf

[sent via e-mail]

Scott Eustis, M.S., Coastal Wetland Specialist

Cc: Matt Rota, Director of Science and Water Policy, Gulf Restoration Network

Aaron Viles, Deputy Director, Gulf Restoration Network

Cyn Sarthou, Director, Gulf Restoration Network

Barry Kohl, PhD, Louisiana Audubon Council

Dean Wilson, Atchafalaya Basinkeeper

Mary Lee Orr, Louisiana Environmental Action Network

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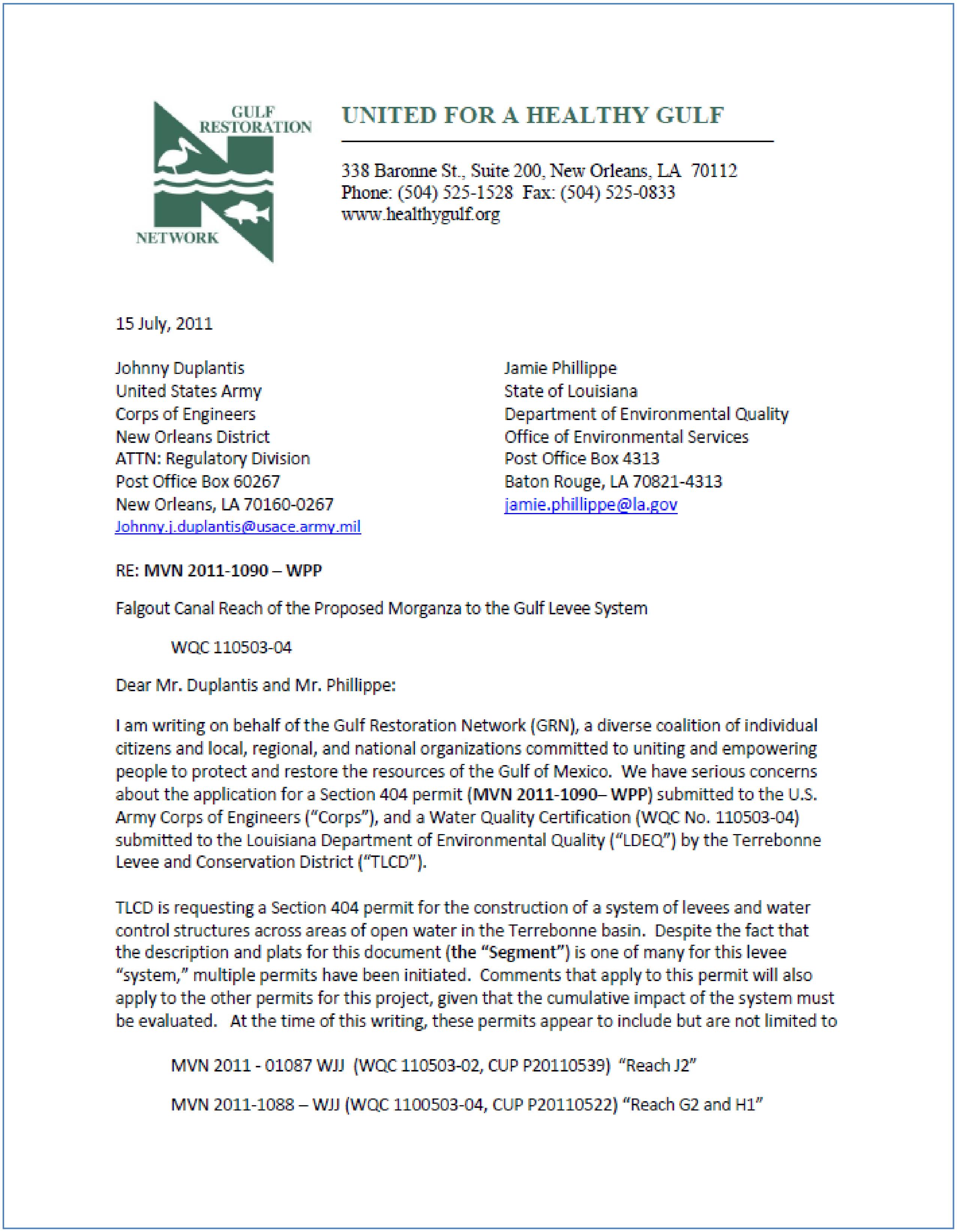
[3] See Appendix A, *Comments on Falgout Canal*

[4] *Id.*

[5] *Id.*

Appendix A

Comment on section 404 permit application for the Falgout Canal segment of the Morganza to the Gulf project



GULF RESTORATION NETWORK

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15 July, 2011

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RE: **MVN 2011-1090 – WPP**

Falgout Canal Reach of the Proposed Morganza to the Gulf Levee System

WQC 110503-04

Dear Mr. Duplantis and Mr. Phillippe:

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. We have serious concerns about the application for a Section 404 permit (**MVN 2011-1090– WPP**) submitted to the U.S. Army Corps of Engineers ("Corps"), and a Water Quality Certification (WQC No. 110503-04) submitted to the Louisiana Department of Environmental Quality ("LDEQ") by the Terrebonne Levee and Conservation District ("TLCD").

TLCD is requesting a Section 404 permit for the construction of a system of levees and water control structures across areas of open water in the Terrebonne basin. Despite the fact that the description and plats for this document (**the "Segment"**) is one of many for this levee "system," multiple permits have been initiated. Comments that apply to this permit will also apply to the other permits for this project, given that the cumulative impact of the system must be evaluated. At the time of this writing, these permits appear to include but are not limited to

MVN 2011 - 01087 WJJ (WQC 110503-02, CUP P20110539) "Reach J2"

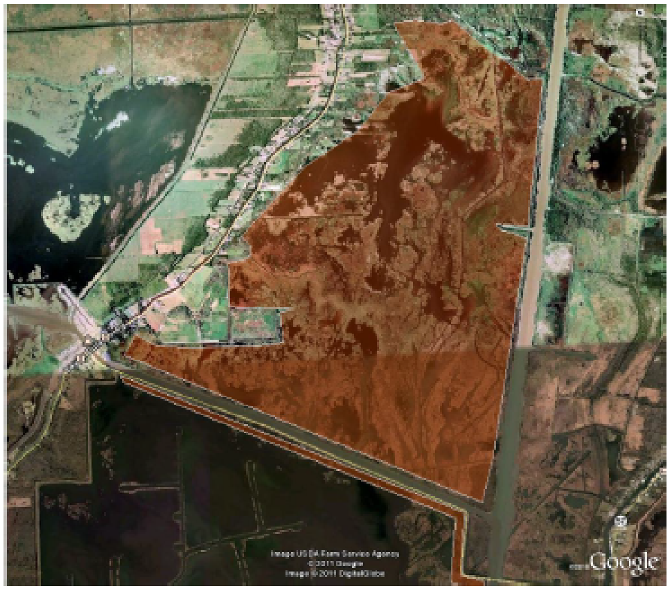
MVN 2011-1088 – WJJ (WQC 1100503-04, CUP P20110522) "Reach G2 and H1"

MVN 2011 – 01090 WPP (WQC 110503-04, CUP P 2011 0522) "Falgout Canal"

We reserve the right to rely on other comments submitted for this permit as well as the other permits initiated for the singular "Levee System" project.

The proposed construction of the segment consists of filling and directly altering 20 acres of jurisdictional brackish marsh. The project would require the deposition of an estimated 746,018 cubic yards of "hauled-in material."

20 acres of brackish wetland have been cited as the footprint of this permit; however, approximately 4,000 acres of intermediate wetlands and waters of the United States, including thousands of acres of marsh, will be impounded or impacted by this project. These acres are not included within the 20 acres attributed to the TLCD's application.



Map showing the 4,000 acre approximate area which will be further impounded by the levee segment. This area is already degraded, but will suffer further hydrological disconnection should this segment be permitted.

The GRN opposes TLCD's request for a Section 404 permit and Water Quality Certification, and we ask that the Corps and LDEQ deny this request based on the following concerns:

1. The Plan subverts the Goals of the Comprehensive Plan for Coastal Restoration in Terrebonne Parish[6] (CPCR), and the goals of ecosystem restoration in Coastal Louisiana in general.

The goals of the Comprehensive Plan are to

- Restore the coastal ecosystem
- Preserve natural coastal processes
- Minimize loss of natural ecosystem services (e.g. flood water storage)
- Ensure availability of a diverse array of natural goods and sevices

Four primary objectives have been set for the CPCR :

1. Increase integrity of barrier island systems
2. Increase vertical accretion of wetland soils
3. Maximize habitat diversity of coastal wetlands
4. Minimize residential development in wetlands south of the GIWW

Filling in and impounding wetlands with the levee alignment proposed achieves none of these goals or objectives and in fact subverts all of them.

It goes without saying that a levee system designed to protect property does not restore or preserve the natural system or processes. This particular alignment of the Morganza project will impound acres of wetlands, which will not minimize the loss of natural ecosystem services, and lessen availability of the diverse array of natural goods and services the local marshes provide.

The history of levee construction in the Mississippi River Delta shows that the Levee System will encourage residential and other unsustainable development in wetlands south of the GIWW. Other levees within the Louisiana delta have already been extended too far into the estuary. Where residential and commercial development has not followed the construction of the levee, the marshes have suffered soil subsidence, rather than accretion. The weakening of marshes leads to marsh loss, water retention loss, and an increase in the volume of the tidal prism[7] flowing in and out of the estuary; and thus an increase in both daily and acute erosional forces upon the marshes as well as the barrier island system at the edge of the basin.

The "environmental" value of this levee system is based upon a misunderstanding that erosion rather than subsurface subsidence is the main driver of wetlands change and loss in the area. Because of this idea that erosional forces are the main driver of previous wetland loss, the conclusion is that a "marsh management" system will preserve remaining wetlands in the area. Marsh management, the use of structures (such as canal plugs, weirs, gates, culverts, levees

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[6] Draft Comprehensive Plan for Coastal Restoration in Terrebonne Parish, February 2009 http://www.tpcg.org/coastal_restoration/docs/TPCPCR_FINAL%20DRAFT.pdf

[7] Encyclopedia of Earth Sciences Series, 2005, 18, 833, DOI: 10.1007/1-4020-3880-1_271

and spoil banks) to manipulate local hydrology in coastal marshes[8], has been shown to alter the pattern of hydrological exchange significantly beyond the objectives of reducing saltwater intrusion and reducing wave energies. In an earlier review of marsh management[9], the Fina LaTerre (currently Apache LaTerre) mitigation bank west of Bayou DuLarge was the object of an MMS study found that 'diurnal tidal variations, winter storms, and lunar tidal cycles were not of sufficient magnitude or duration to cause changes in water level' within the managed area. In other words, natural cycles were stopped rather than "managed."

> Monitoring of two brackish marshes during drawdown years indicated that management reduced (1) water-level fluctuations; (2) the import of water, sediment, and nutrients; (3) vertical accretion; (4) soil bulk density; (5) accumulation of organic and mineral matter; and (6) the ingress and egress of marine transient fish species.
>
> --Cahoon and Groat, 1990

During water drawdown periods, unmanaged brackish marsh outside of the impoundment structure had a significantly higher vertical accretion rate, higher soil bulk density and soil mineral matter, as well as a higher rate of organic accumulation.

The State Master Plan also states that "overall hydrology must be improved by minimizing impediments to water flow."[10] Allowing TLCD to impact over 4,000 acres of wetlands and waters of the United States in this Segment is obviously inconsistent with the mandate to improve hydrology and minimize impediments to water flow. The destruction of water flow is contrary to the objectives of the Master Plan.

It is apparent, then, that the alignment of this levee project impounds the marsh in such a way that undermines the goals of Louisiana and Terrebonne parish. The goal of vertical accretion is one that ensures a healthy marsh with strong soils that can withstand storms, hold water, and grow with the rising sea level. Impounding them weakens vertical accretion, and destroys the function of the marsh. Impounding the marshes also increases the costs of future restoration of these marshes, prohibitively. It can exclude the sunken marsh platform from ever being restored.

This levee system alignment, as proposed, rests on a misunderstanding of the ecology of coastal marshes and the geology of the region. Because of this misunderstanding, this alignment subverts the objectives and goals of the Terrebonne Comprehensive Plan and the State Master Plan for coastal restoration. Therefore, construction of this Segment should not be allowed.

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[8] "Ecological Impacts And Evaluation Criteria For The Use Of Structures In Marsh Management" USEPA EPA-SAB-EPEC-98-003, Jan 1998.

[9] Cahoon and Groat, ed. 1990. A Study of Marsh Management Practice in Coastal Louisiana. http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/3/3658.pdf

[10] http://www.lacpra.org/assets/docs/cprafinalreport_pg77_pg85_5-2-07.pdf

2. The Levee system, and particularly this Segment, is technically unsound.

Although the ecological damages to wetlands are the major matter of concern to the CWA 404 review, the corps should consider that the proposed levee system will not provide adequate flood protection, and may aggravate the vulnerabilities of the public to flooding from coastal storms. The protective capabilities of the levee system as proposed are overstated and misrepresented to the public.

The acreage listed as the footprint of the segment demonstrates that the levee will be built directly in tidal waters of the United States.

As the segment is built directly in water between ridges, it will fill like a basin when the gates are closed, and will potentially backflood communities on the ridges behind it as rainwaters from the hurricane fill the artificial "bowl." This problem will become worse as the marsh behind the segment degrades.

The segment crosses between ridges, across highly organic soils, which are likely "to have very poor geotechnical attributes for construction of a levee" (LPBF, 2008)[11]. Therefore, the Corps should not allow a levee to be built in this area. After the failure of hurricane levees post-Katrina, new soil standards for levees were adopted by the Corps. As this levee project is intended to encourage the Corps to build proper, higher levees along this alignment at a later date, Fill hauled in for this levee should be to the elevated standard.

The Project would create a funnel effect[12] that will require evaluation. This 'funnel effect' refers to levee alignments, which are not smooth but have angles between somewhat linear segments of the levee. To have a funnel effect, the angle needs to be open on the flood side of the levee.

> Therefore, as surge approaches the levee, the surge is deflected toward the apex of the angle where there is less space for the water, forcing it upward. The water is focused by the convergence of the levees and is forced upward, raising surge elevation higher than what might occur without the levee...(LPBF, 2008)

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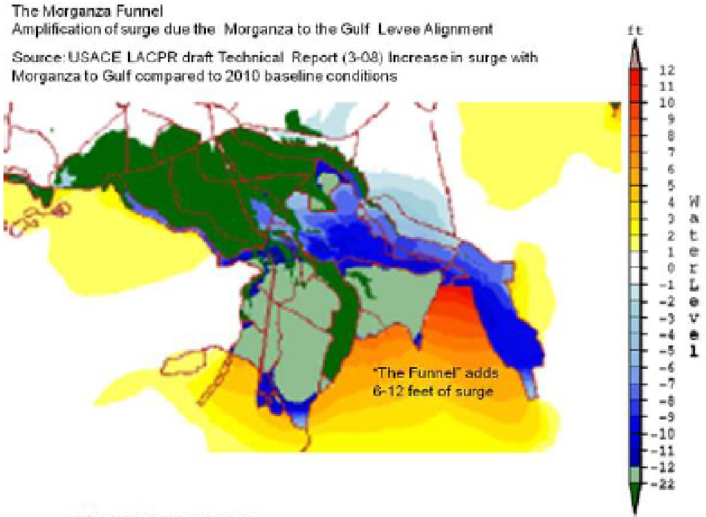
[11] http://mlods.org (LPBF, 2008)

[12] Robinson v. U.S., 06-cv-02268


The Morganza Funnel
Amplification of surge due the Morganza to the Gulf Levee Alignment

Source: USACE LACPR draft Technical Report (3-08) Increase in surge with Morganza to Gulf compared to 2010 baseline conditions

Adapted from LPBF 2008

Adapted from LPBF 2008. hydrological modeling has shown that a gulfward levee alignment whose angles open toward the gulf can create a "Funnel" effect.

This proposed alignment for Morganza to the Gulf may create a funnel effect of 8-12 feet between the ridges of Bayou Pointe Chien and Bayou Terrebonne, thus increasing the likelihood of overtopping the few feet of levee proposed.

As reported by the technical review comment[13] for the project,

> The construction of some segments prior to others (such as is already taking place with the TLCD Reach J Segment 1 work) may have unforeseen implications for surge focusing. Surge modeling should be repeated for the project area each time there is a major phase completed.

Under certain project storms modeled by the Corps, the Project will create a funnel effect possibly as high as the height of the levee itself. This is without consideration that the levee will sink in height as time passes.

As the damages are great and the benefits meager, and the public does not understand the risk reduction entailed, the Corps should not allow this segment or this project as aligned.

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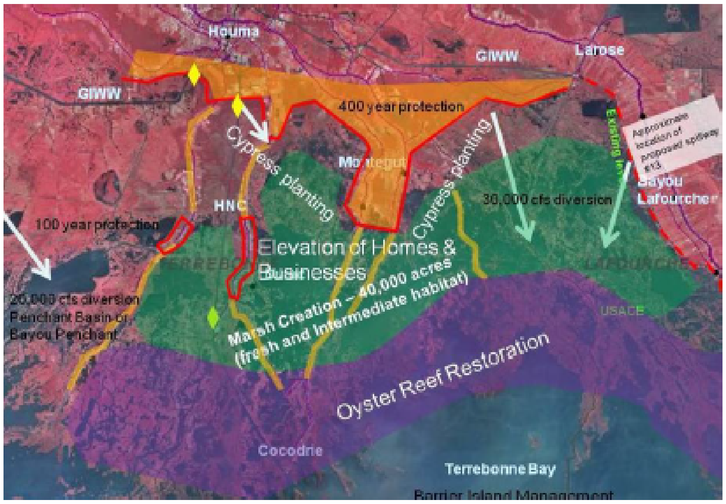
[13] http://www.houmatoday.com/assets/pdf/HC14180128.PDF

3. The many alternatives proposed for this project have not been adequately addressed. Alternatives do not include this segment of the project.

The Public Notice gives no indication whether applicant evaluated any of the existing or any new alternatives. This alternative analysis must include direct, indirect, secondary, and cumulative impacts that take into account water quality, wildlife, and flood protection.

For example, Given a certain length for the levee alignment, indirect impacts to wetland areas could be minimized if the development were relocated to natural ridge lines, and direct impacts could be minimized by locating the project closer to the GIWW while augmenting the parish ring levees to a higher level of protection.



Lines of Defense alignment recommendation in red (LPBF 2008). this alignment would allow for much higher protection behind levees, and allow for restoration of areas impounded by this segment and project, in line with the stated Goals and objectives of the CPCR.

Alternatives aligned further up the estuary than the current segment and project alignment would allow for future restoration of the marshes, and would provide greater protection if combined with proper land use planning and evacuation strategies as additional "Lines of Defense."

We request that the notice include an evaluation of the alternatives proposed for this project, with a rationale for their rejection.

4. The standing mitigation plan is woefully inadequate. The final plan, including a mitigation plan, should be made available to the public before any permits are granted.

Under a previous mitigation plan, the Corps required only "1,352 acres of new marsh" for the hundred thousand acres or more impacted by the project at this alignment. Thousands of acres of marsh are impounded by this Segment alone. This is abysmally low, and the applicant and the Corps (according to the Modified Charleston Method) should justify why there is so little mitigation for the destruction over such a large area.

We demand that the Corps justify this lack of mitigation for direct, indirect and secondary impacts.

We feel that the current Public Notice system is not adequate to fully involve the public in the Section 404 permitting process. The only item available to the public in the entire process is the initial Public Notice, which occurs before the Corps and the permitted go through the "avoid, minimize, and mitigate" process. Therefore, the public is never given the opportunity to comment on the final project including the mitigation plan.

We *request more information in the initial Public Notice (e.g., preliminary mitigation plans, efforts made to avoid impacts, necessity of project location, adequate alternative analysis, environmental assessments, etc.).*

We also request this information in writing, and in the other public notices associated with this Levee Project.

5. We question that any mitigation for lost wetlands could completely replace the function and values lost.

Mitigation is required for all impacts of this Segment. Compensatory mitigation in distant ecosystems with no ecological interrelation with the parcel and locality at issue wholly removes any meaning behind the word "compensatory."

The obvious location for mitigation would be created marshes gulfward of the levee alignment, Marsh created outside of the ridge as mitigation would protect the levee, reducing maintenance costs and increasing protection from storms. The marsh would be created atop an older marsh platform that has been destroyed over a couple of decades by oil and gas and shipping industry impacts.

In conclusion, the Corps and LDEQ must take the mandates of the Clean Water Act and related federal regulations seriously; this is compounded by the inadequacy of the Public Notice, particularly in regard for proposed alternatives.

We request notification of approvals/denials/changes to TLCD's Section 404 permit and Water Quality Certification request, as well as an Updated Environmental Impact Statement that quantitatively evaluates direct, indirect, secondary, and cumulative impacts.

6. Because this permit and project is located within an area vulnerable to storm surge, FEMA should be included in the agency review of this permit.

These wetlands lie within the inland extent of storm surge per the SLOSH model of the National Hurricane Center, as well as within the 100-year floodplain. Since FEMA is charged with administering the flood insurance program for this levee project, they should also be informed of this permit, which places people and developed property in harm's way.

As this levee project is not intended to meet 100-year standards of flood protection, FEMA should be duly notified to increase their educational efforts for the affected population, who will be misled.

7. Direct, indirect, secondary, and cumulative impacts must be fully considered.

Given the information in the Public Notice, it does not appear that TLCD has fully considered the direct impacts, or even addressed indirect, secondary, and cumulative impacts of the proposed wetland fill and clearing:

<u>Direct impacts</u> – The direct impacts of this project are certainly significant. There could be a considerable impact to water quality and wildlife habitat.

Also, the fill of such a large area is in violation of the federal and state anti-degradation policy. The Louisiana policy states, "the administrative authority will not approve any wastewater discharge or certify any activity for federal permit that would impair water quality or use of state waters."[14]

Additionally, the Federal regulations have not been fully implemented. Per executive orders 11988 and 11990, in order to prevent impacts to wetlands certain aspects need to be analyzed.

Title 18 of the Code of Federal Regulations states,

> It is the policy of the Council to provide leadership in floodplain management and the protection of wetlands. Further, the Council shall integrate the goals of the Orders to the greatest possible degree into its procedures for implementing the National Environmental Policy Act. The Council shall take action to: Avoid long- and short-term adverse impacts associated with the occupancy and modification of floodplains and the destruction or modification of wetlands; Avoid direct and indirect support of floodplain development and new construction in wetlands wherever there is a practicable alternative; Reduce the risk of flood loss; Promote the use of nonstructural loss reduction methods to reduce the risk of flood loss; Minimize the impact of floods on human health, safety and welfare; Minimize the destruction, loss or degradation of wetlands; Restore and preserve the

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[14] LA. ADMIN. CODE tit. 33, pt. IX §1109(A)(2).

> natural and beneficial values served by floodplains; Preserve and enhance the natural and beneficial values served by wetlands.[15]

Given that the public notice does not thoroughly adhere to the executive order, LDEQ and the Corps should deny the permit application.

Indirect and Secondary impacts – This project has and will further destroy wetlands that act as a buffer to reoccurring storms and localized flooding. The destruction of these wetlands, in subversion to the Terrebonne and State Master Plans, would certainly contribute to the weakening of the state's storm defenses. The Code of Federal Regulations recognizes the significance of secondary impacts from wetland destruction by emphasizing that "minor loss of wetland acreage may result in major losses through secondary impacts."[16] Although the applicant claims that these structures will benefit the impounded wetlands, marsh management has been shown to weaken the marsh. The Applicant should offer an analysis of probable secondary impacts based upon the review of marsh management previously cited.

Cumulative impacts

The Corps must be required to look at cumulative impacts before they can approve 404 permits. According to Federal Regulations, cumulative and secondary impacts must be considered for proposals that consider dredging and filling wetlands[17]. This requirement has been reinforced by court rulings. For example, the 5th Circuit Court of Appeals held in 2007 in the case of O'Reilly v. US. Army Corps of Engineers, that when the Corps performs an Environmental Assessment, or EA, it is required to look at cumulative impacts of the project that the agency has permitted along with any past, present, and foreseeable future development in the project area. In the case of that development proposal, the Court determined that the Corps was required to consider the cumulative impacts of 72 other Sec. 404 permits the agency had issued within a 3-mile radius of the proposed project site. The future developments the Court required the Corps to consider included "closely related and proposed or reasonably foreseeable actions that are related by timing or geography."

A cumulative impact is "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 other actions." Fritiofson v. Alexander, 772 F.2d 1225, 1245 (5th Cir. 1985)

Despite the 2007 court ruling and the Federal Regulations, the Corps has not been able to account for cumulative impacts in the New Orleans District despite numerous requests from the NGO community in the years that preceded and have followed the court decision.

Therefore we request that Corps headquarters analyse the cumulative impacts of this project, in light of the long history of human impact to the area, and the future challenge of sea level rise.

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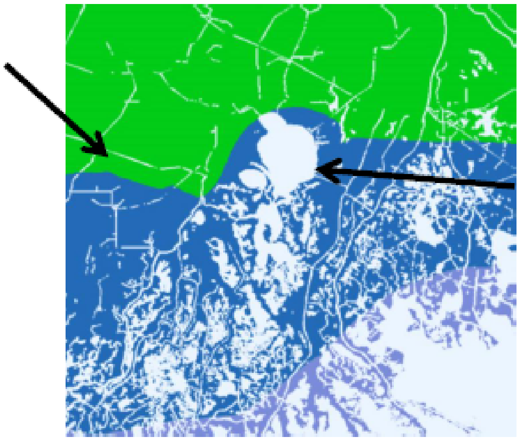
[15] 18 C.F.R. §725.2.

[16] 40 CFR §230.41.

[17] 40 CFR § 230.11(g)

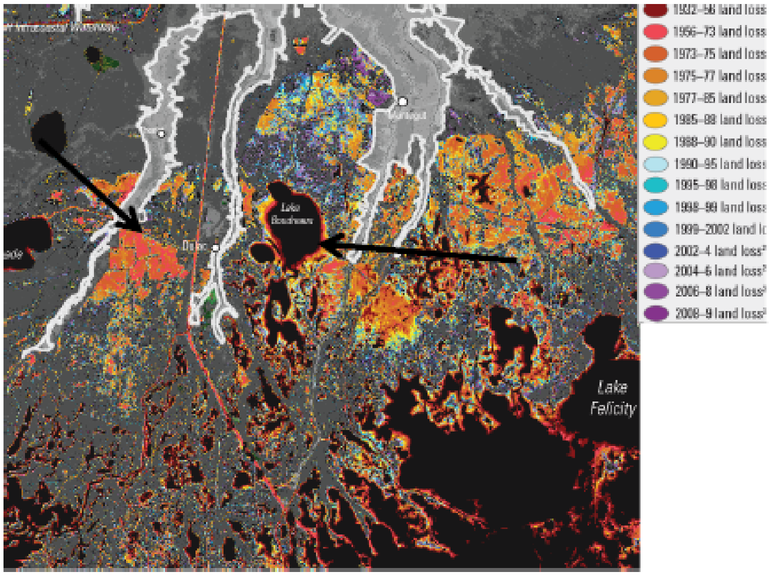
There will be more than a hundred thousand acres of damages to the Terrebonne Basin as a result of this Project. There have already been many thousands of acres lost to human impact in the impacted area.



Adapted from O'Neil, T., 1949. "The Muskrat in the Louisiana Coastal Marshes." This 1949 wetlands classification,shows fresh marsh above and around Falgout canal and above Lake Boudreaux in light green, Brackish marsh in blue, and Saline marsh in purple. Arrows point to Falgout Canal (on left) and Lake Boudreaux (on right) as common features.

Adapted from LDWF, 2001. 2001 wetlands classification, showing the increase of fastlands further down the bayou, the retreat of freshwater and brackish marsh, the increase in number of canals and intermediate marsh plant communities (light blue) in the marsh management areas in question, as well as general land loss and advancement of saline marsh up the bayou.

Before The Houma Navigational Canal was dredged, fresh marsh and some cypress forest extended to the Falgout canal. After this canal placed more salt water into the marshes, and oil and gas extraction caused rapid subsidence of the area, the marshes below falgout canal declined rapidly. The marshes above the canal were protected and impounded with marsh management structures and rock armoring of the Houma Navigation Canal. The description and history of these marshes in the Coast 2050 document[18] mentions the high rate of subsidence, but fails to cite a mechanism. This was clarified by USGS open file report 00-418, and further work, based on the methods of Morton et al.[19], would clarify the importance of separate mechanisms of wetlands loss.



Adapted from Couvillion et al., 2011, "Land Area Change in Coastal Louisiana (1932-2010)" SIM 3164. Time periods of land loss within and around the Project area. The vast majority of interior marsh lost to water was lost between 1956 and 1977. The exception is erosion around Lake Boudreaux, and different impacts interior of Lake Boudreaux.

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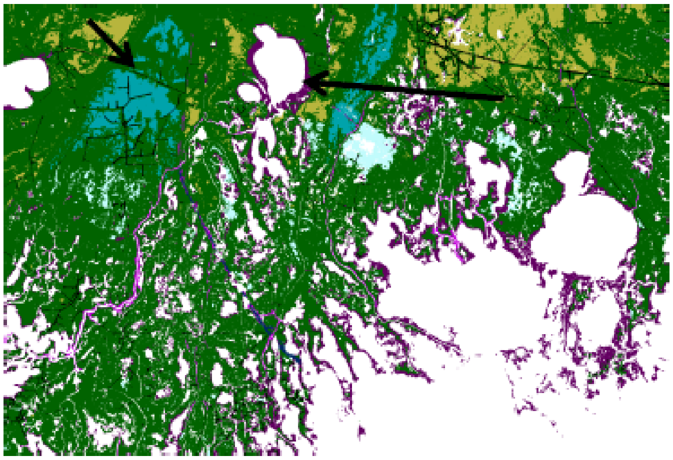
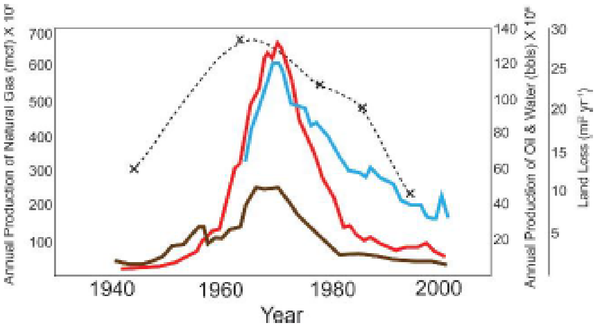
[18] Coast 2050: Toward a Sustainable Coastal Louisiana; appendix E: Region 3 Supplementary Information. http://www.crcl.org/images/2050app_e.pdf

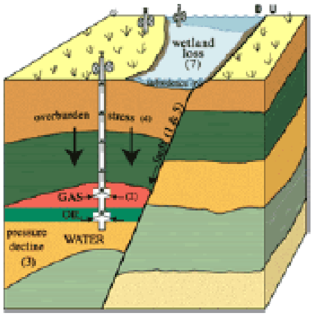
[19] http://coastal.er.usgs.gov/gc-subsidence/



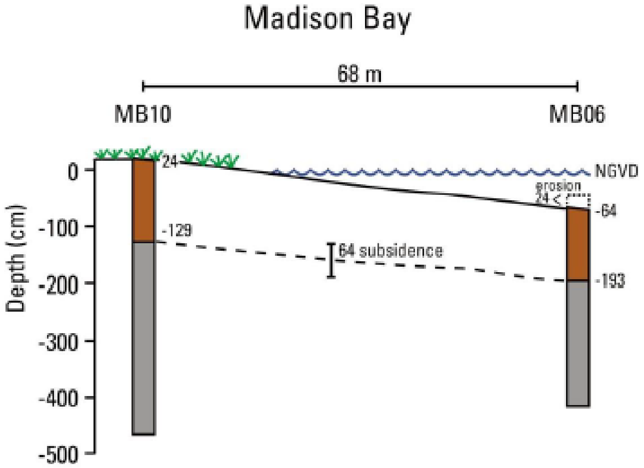
Penland et al, 2000. USGS ofr 00-418. "Process Classification of Coastal Land Loss Between 1932 and 1990…" Areas in green are persistent wetlands as of 1990. Yellow areas are acreages of marsh lost to indirect oil and gas impacts. Black are direct removal of marshes by oil and gas canals. Dark blue areas are marshland lost through a combination of oil and gas and other hydrological impacts. Purple areas have been lost due to erosion, dark purple is natural erosion, light purple is erosion from shipping activity.



From Morton et al, 2005. Land loss and fluid extraction from the Louisiana Delta are correlated in space and time, for individual oil fields as well as for the region as a whole. The dotted line shows the trend of land loss, the brown line oil, the red line gas, and the blue line water.



From Mortion et al. rapid "hotspot" subsidence from fluid withdrawal activates subsurface faults, such that the footprint of the sunken marsh does not track the footprint of oil fields exactly. This sunken (rather than eroded) marsh can be detected by vibracores.



From Morton et al., 2008. How paired vibracores show the difference between surface effects and subsurface effects. The organic marsh layer is represented in brown. In Madison Bay, subsurface subsidence attributed 64 cm to RSLR. Subsidence of this magnitude is attributed to many factors; fluid extraction has the largest subsidence effect.

The Segment is being built in an area subject to rapid interior subsidence due to oil and gas extraction and impoundment, as well as additional hydrological impacts from the Houma Navigational Canal[20] (shown in darker blue in the figure above.) Thousands of acres of marsh has already been impacted in this sub-basin and the sub-basin gulfward of it by human activity. The destruction of this marsh has allowed surges further into the interior, endangering property and the public welfare, and spurring a call for artificial protection.

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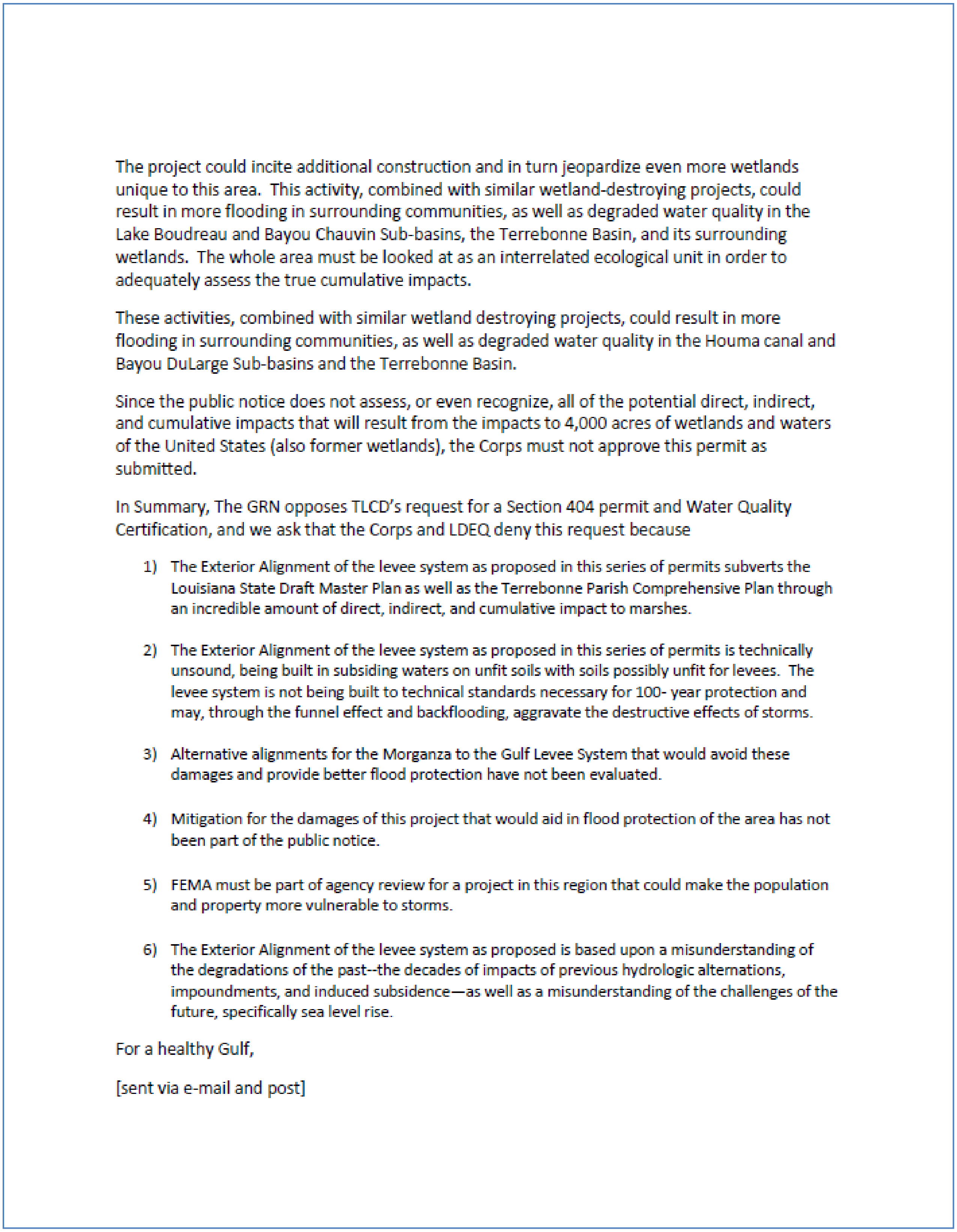
[20] Penland et al, 2000. USGS open file report 00-418



The project could incite additional construction and in turn jeopardize even more wetlands unique to this area. This activity, combined with similar wetland-destroying projects, could result in more flooding in surrounding communities, as well as degraded water quality in the Lake Boudreau and Bayou Chauvin Sub-basins, the Terrebonne Basin, and its surrounding wetlands. The whole area must be looked at as an interrelated ecological unit in order to adequately assess the true cumulative impacts.

These activities, combined with similar wetland destroying projects, could result in more flooding in surrounding communities, as well as degraded water quality in the Houma canal and Bayou DuLarge Sub-basins and the Terrebonne Basin.

Since the public notice does not assess, or even recognize, all of the potential direct, indirect, and cumulative impacts that will result from the impacts to 4,000 acres of wetlands and waters of the United States (also former wetlands), the Corps must not approve this permit as submitted.

In Summary, The GRN opposes TLCD's request for a Section 404 permit and Water Quality Certification, and we ask that the Corps and LDEQ deny this request because

1) The Exterior Alignment of the levee system as proposed in this series of permits subverts the Louisiana State Draft Master Plan as well as the Terrebonne Parish Comprehensive Plan through an incredible amount of direct, indirect, and cumulative impact to marshes.

2) The Exterior Alignment of the levee system as proposed in this series of permits is technically unsound, being built in subsiding waters on unfit soils with soils possibly unfit for levees. The levee system is not being built to technical standards necessary for 100- year protection and may, through the funnel effect and backflooding, aggravate the destructive effects of storms.

3) Alternative alignments for the Morganza to the Gulf Levee System that would avoid these damages and provide better flood protection have not been evaluated.

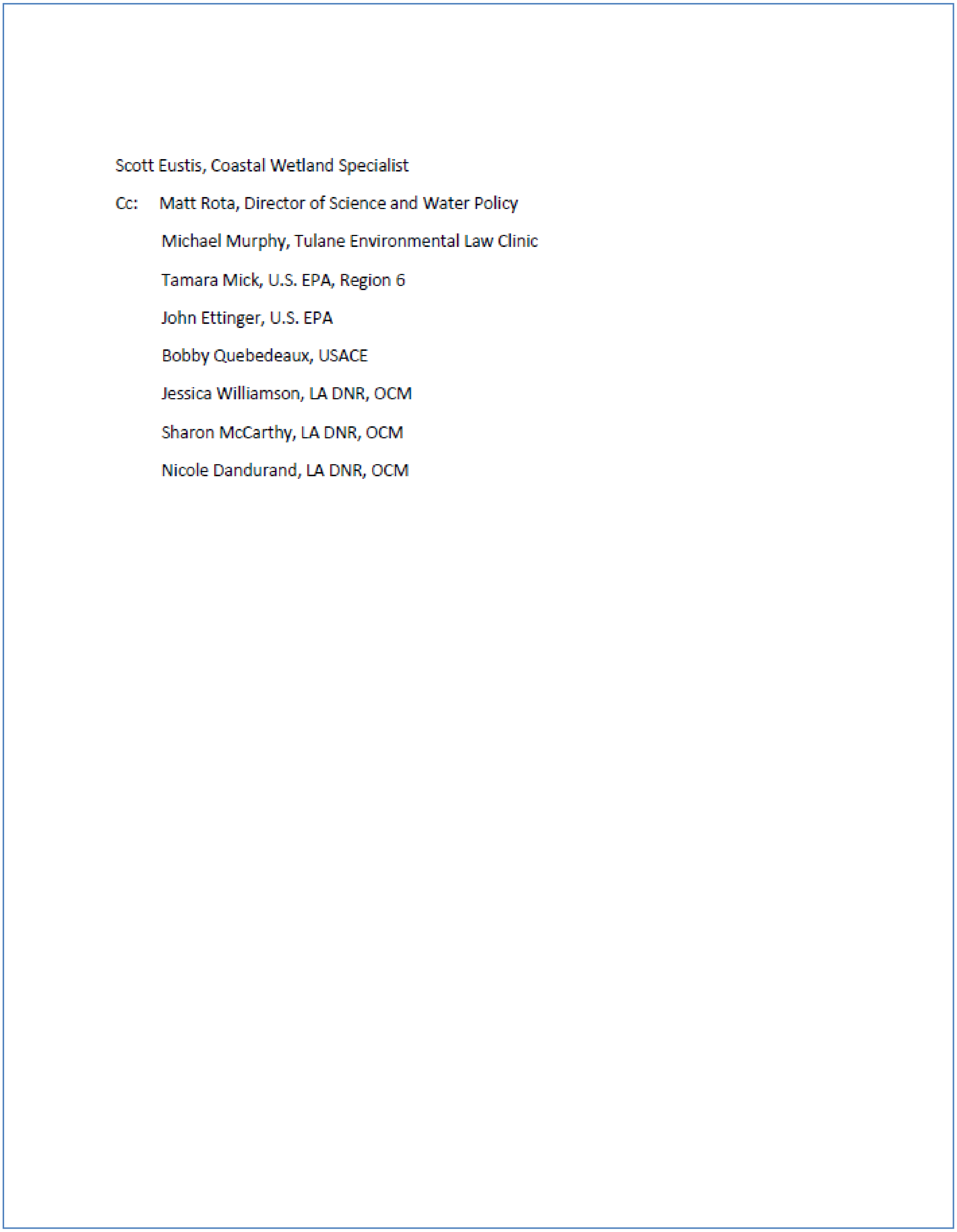
4) Mitigation for the damages of this project that would aid in flood protection of the area has not been part of the public notice.

5) FEMA must be part of agency review for a project in this region that could make the population and property more vulnerable to storms.

6) The Exterior Alignment of the levee system as proposed is based upon a misunderstanding of the degradations of the past--the decades of impacts of previous hydrologic alternations, impoundments, and induced subsidence—as well as a misunderstanding of the challenges of the future, specifically sea level rise.

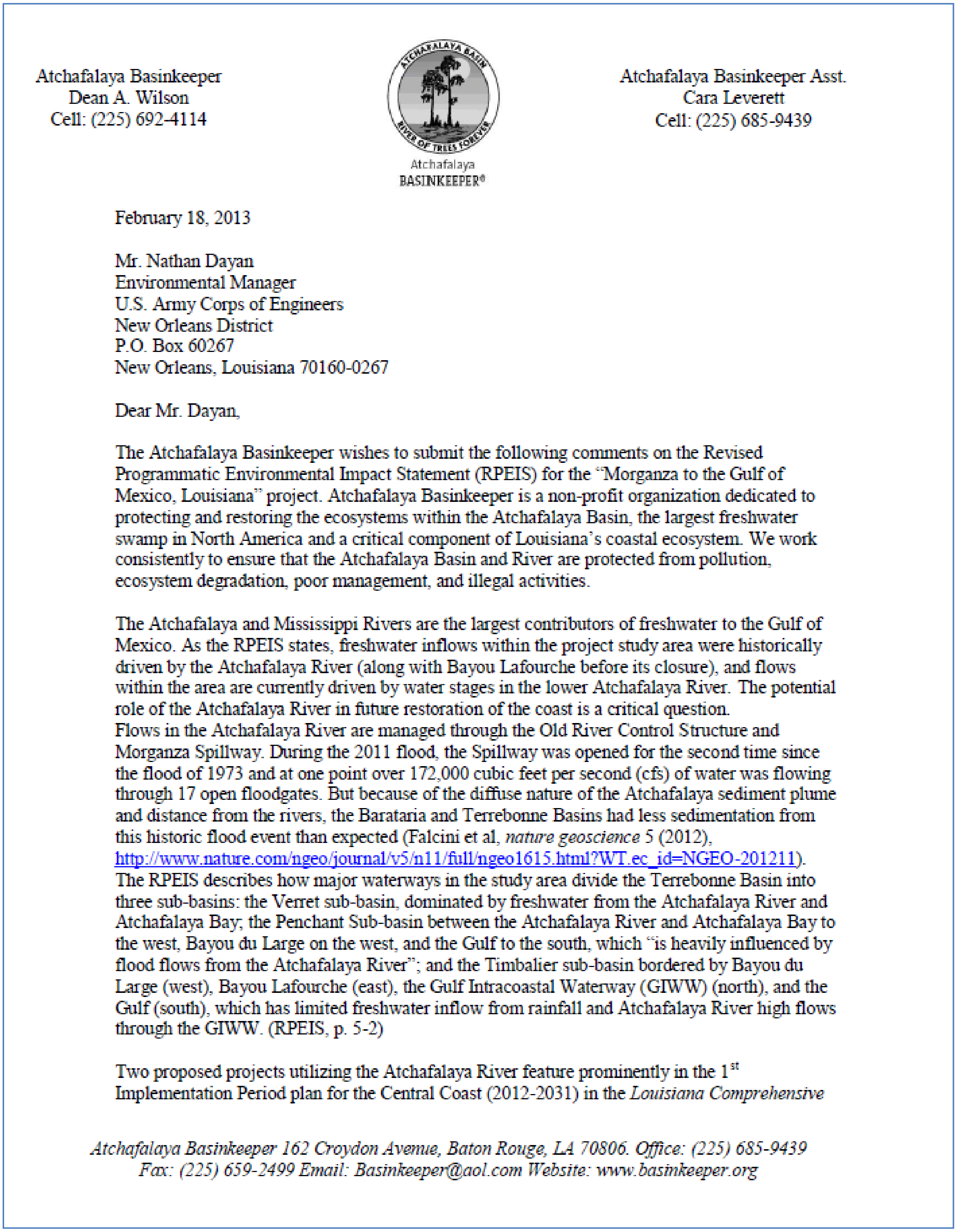
For a healthy Gulf,

[sent via e-mail and post]



Scott Eustis, Coastal Wetland Specialist

Cc: Matt Rota, Director of Science and Water Policy
Michael Murphy, Tulane Environmental Law Clinic
Tamara Mick, U.S. EPA, Region 6
John Ettinger, U.S. EPA
Bobby Quebedeaux, USACE
Jessica Williamson, LA DNR, OCM
Sharon McCarthy, LA DNR, OCM
Nicole Dandurand, LA DNR, OCM



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February 18, 2013

Mr. Nathan Dayan
Environmental Manager
U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Dayan,

The Atchafalaya Basinkeeper wishes to submit the following comments on the Revised Programmatic Environmental Impact Statement (RPEIS) for the "Morganza to the Gulf of Mexico, Louisiana" project. Atchafalaya Basinkeeper is a non-profit organization dedicated to protecting and restoring the ecosystems within the Atchafalaya Basin, the largest freshwater swamp in North America and a critical component of Louisiana's coastal ecosystem. We work consistently to ensure that the Atchafalaya Basin and River are protected from pollution, ecosystem degradation, poor management, and illegal activities.

The Atchafalaya and Mississippi Rivers are the largest contributors of freshwater to the Gulf of Mexico. As the RPEIS states, freshwater inflows within the project study area were historically driven by the Atchafalaya River (along with Bayou Lafourche before its closure), and flows within the area are currently driven by water stages in the lower Atchafalaya River. The potential role of the Atchafalaya River in future restoration of the coast is a critical question.
Flows in the Atchafalaya River are managed through the Old River Control Structure and Morganza Spillway. During the 2011 flood, the Spillway was opened for the second time since the flood of 1973 and at one point over 172,000 cubic feet per second (cfs) of water was flowing through 17 open floodgates. But because of the diffuse nature of the Atchafalaya sediment plume and distance from the rivers, the Barataria and Terrebonne Basins had less sedimentation from this historic flood event than expected (Falcini et al, *nature geoscience* 5 (2012), http://www.nature.com/ngeo/journal/v5/n11/full/ngeo1615.html?WT.ec_id=NGEO-201211).
The RPEIS describes how major waterways in the study area divide the Terrebonne Basin into three sub-basins: the Verret sub-basin, dominated by freshwater from the Atchafalaya River and Atchafalaya Bay; the Penchant Sub-basin between the Atchafalaya River and Atchafalaya Bay to the west, Bayou du Large on the west, and the Gulf to the south, which "is heavily influenced by flood flows from the Atchafalaya River"; and the Timbalier sub-basin bordered by Bayou du Large (west), Bayou Lafourche (east), the Gulf Intracoastal Waterway (GIWW) (north), and the Gulf (south), which has limited freshwater inflow from rainfall and Atchafalaya River high flows through the GIWW. (RPEIS, p. 5-2)

Two proposed projects utilizing the Atchafalaya River feature prominently in the 1st Implementation Period plan for the Central Coast (2012-2031) in the *Louisiana Comprehensive*

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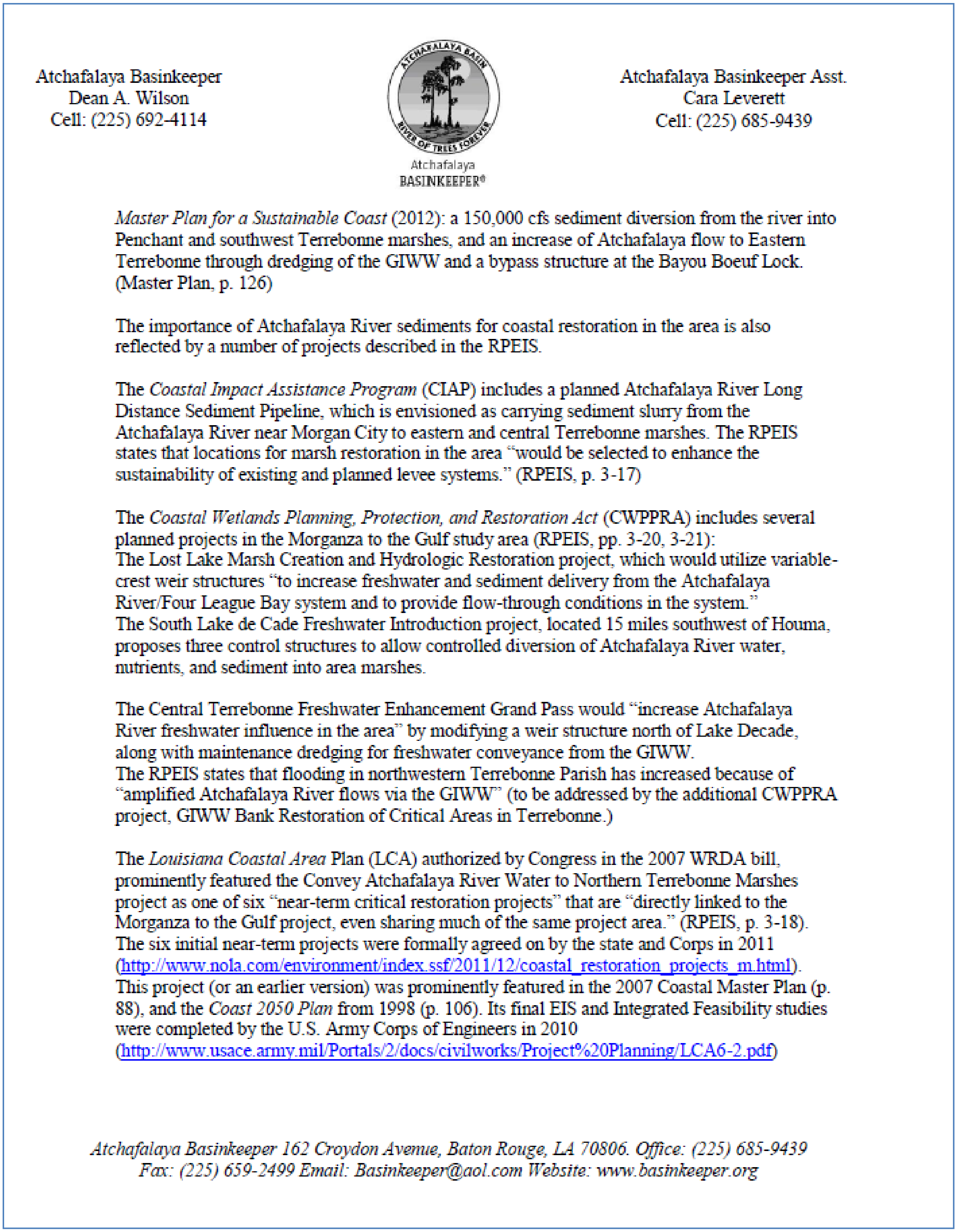

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Master Plan for a Sustainable Coast (2012): a 150,000 cfs sediment diversion from the river into Penchant and southwest Terrebonne marshes, and an increase of Atchafalaya flow to Eastern Terrebonne through dredging of the GIWW and a bypass structure at the Bayou Boeuf Lock. (Master Plan, p. 126)

The importance of Atchafalaya River sediments for coastal restoration in the area is also reflected by a number of projects described in the RPEIS.

The *Coastal Impact Assistance Program* (CIAP) includes a planned Atchafalaya River Long Distance Sediment Pipeline, which is envisioned as carrying sediment slurry from the Atchafalaya River near Morgan City to eastern and central Terrebonne marshes. The RPEIS states that locations for marsh restoration in the area "would be selected to enhance the sustainability of existing and planned levee systems." (RPEIS, p. 3-17)

The *Coastal Wetlands Planning, Protection, and Restoration Act* (CWPPRA) includes several planned projects in the Morganza to the Gulf study area (RPEIS, pp. 3-20, 3-21):

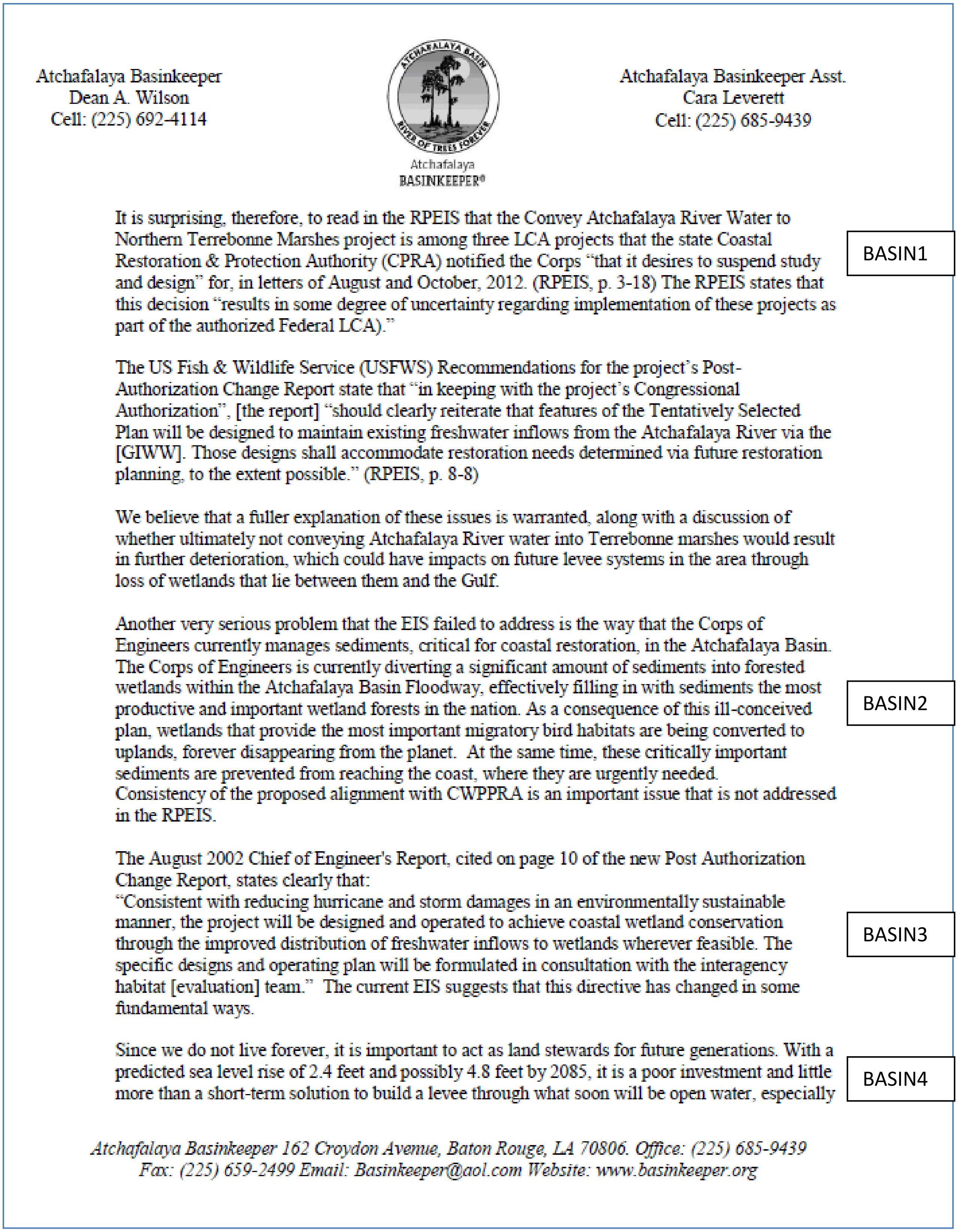
The Lost Lake Marsh Creation and Hydrologic Restoration project, which would utilize variable-crest weir structures "to increase freshwater and sediment delivery from the Atchafalaya River/Four League Bay system and to provide flow-through conditions in the system."

The South Lake de Cade Freshwater Introduction project, located 15 miles southwest of Houma, proposes three control structures to allow controlled diversion of Atchafalaya River water, nutrients, and sediment into area marshes.

The Central Terrebonne Freshwater Enhancement Grand Pass would "increase Atchafalaya River freshwater influence in the area" by modifying a weir structure north of Lake Decade, along with maintenance dredging for freshwater conveyance from the GIWW.

The RPEIS states that flooding in northwestern Terrebonne Parish has increased because of "amplified Atchafalaya River flows via the GIWW" (to be addressed by the additional CWPPRA project, GIWW Bank Restoration of Critical Areas in Terrebonne.)

The *Louisiana Coastal Area* Plan (LCA) authorized by Congress in the 2007 WRDA bill, prominently featured the Convey Atchafalaya River Water to Northern Terrebonne Marshes project as one of six "near-term critical restoration projects" that are "directly linked to the Morganza to the Gulf project, even sharing much of the same project area." (RPEIS, p. 3-18). The six initial near-term projects were formally agreed on by the state and Corps in 2011 (http://www.nola.com/environment/index.ssf/2011/12/coastal_restoration_projects_m.html). This project (or an earlier version) was prominently featured in the 2007 Coastal Master Plan (p. 88), and the *Coast 2050 Plan* from 1998 (p. 106). Its final EIS and Integrated Feasibility studies were completed by the U.S. Army Corps of Engineers in 2010 (http://www.usace.army.mil/Portals/2/docs/civilworks/Project%20Planning/LCA6-2.pdf)



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It is surprising, therefore, to read in the RPEIS that the Convey Atchafalaya River Water to Northern Terrebonne Marshes project is among three LCA projects that the state Coastal Restoration & Protection Authority (CPRA) notified the Corps "that it desires to suspend study and design" for, in letters of August and October, 2012. (RPEIS, p. 3-18) The RPEIS states that this decision "results in some degree of uncertainty regarding implementation of these projects as part of the authorized Federal LCA)."

BASIN1

The US Fish & Wildlife Service (USFWS) Recommendations for the project's Post-Authorization Change Report state that "in keeping with the project's Congressional Authorization", [the report] "should clearly reiterate that features of the Tentatively Selected Plan will be designed to maintain existing freshwater inflows from the Atchafalaya River via the [GIWW]. Those designs shall accommodate restoration needs determined via future restoration planning, to the extent possible." (RPEIS, p. 8-8)

We believe that a fuller explanation of these issues is warranted, along with a discussion of whether ultimately not conveying Atchafalaya River water into Terrebonne marshes would result in further deterioration, which could have impacts on future levee systems in the area through loss of wetlands that lie between them and the Gulf.

Another very serious problem that the EIS failed to address is the way that the Corps of Engineers currently manages sediments, critical for coastal restoration, in the Atchafalaya Basin. The Corps of Engineers is currently diverting a significant amount of sediments into forested wetlands within the Atchafalaya Basin Floodway, effectively filling in with sediments the most productive and important wetland forests in the nation. As a consequence of this ill-conceived plan, wetlands that provide the most important migratory bird habitats are being converted to uplands, forever disappearing from the planet. At the same time, these critically important sediments are prevented from reaching the coast, where they are urgently needed. Consistency of the proposed alignment with CWPPRA is an important issue that is not addressed in the RPEIS.

BASIN2

The August 2002 Chief of Engineer's Report, cited on page 10 of the new Post Authorization Change Report, states clearly that:
"Consistent with reducing hurricane and storm damages in an environmentally sustainable manner, the project will be designed and operated to achieve coastal wetland conservation through the improved distribution of freshwater inflows to wetlands wherever feasible. The specific designs and operating plan will be formulated in consultation with the interagency habitat [evaluation] team." The current EIS suggests that this directive has changed in some fundamental ways.

BASIN3

Since we do not live forever, it is important to act as land stewards for future generations. With a predicted sea level rise of 2.4 feet and possibly 4.8 feet by 2085, it is a poor investment and little more than a short-term solution to build a levee through what soon will be open water, especially

BASIN4

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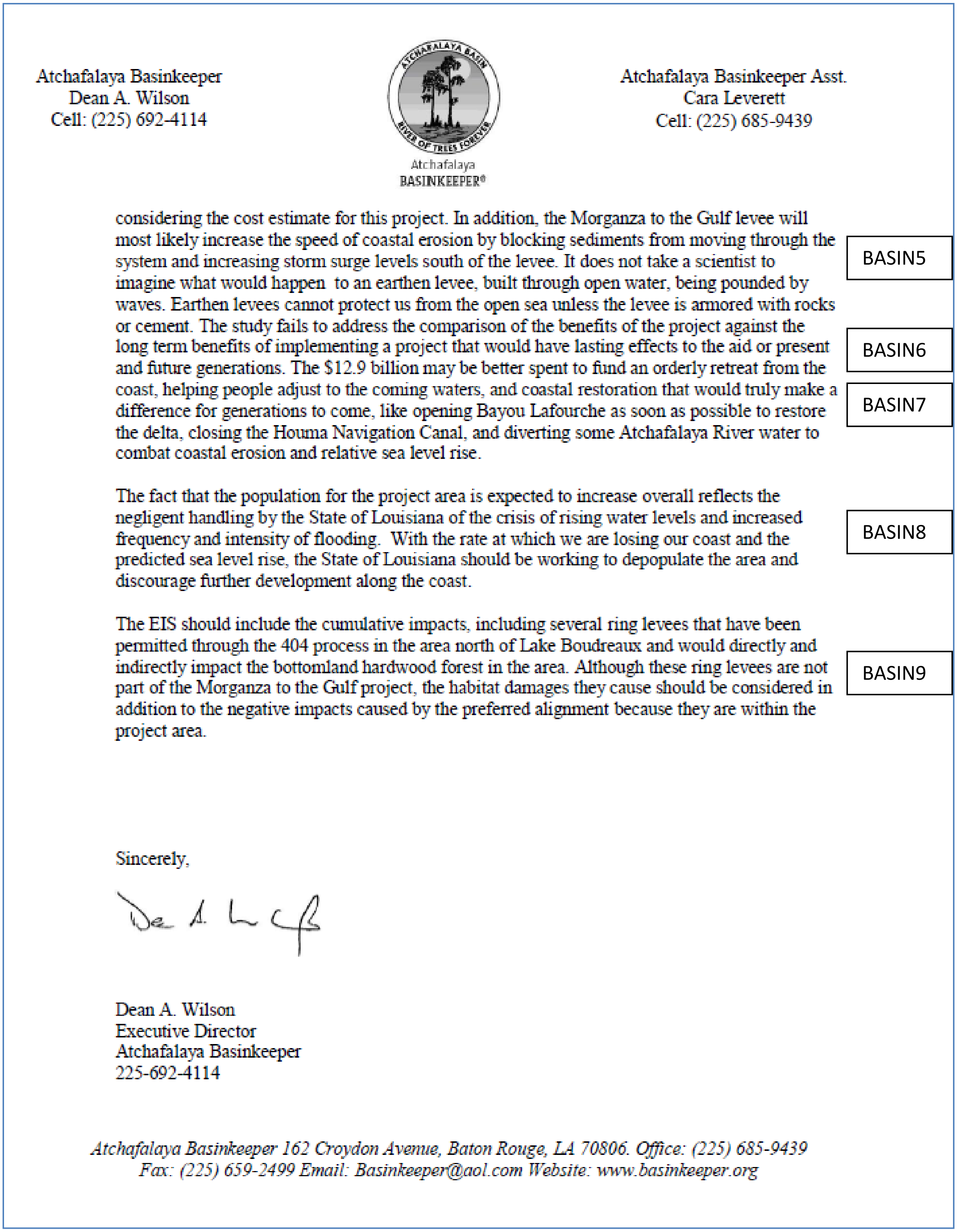

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considering the cost estimate for this project. In addition, the Morganza to the Gulf levee will most likely increase the speed of coastal erosion by blocking sediments from moving through the system and increasing storm surge levels south of the levee. It does not take a scientist to imagine what would happen to an earthen levee, built through open water, being pounded by waves. Earthen levees cannot protect us from the open sea unless the levee is armored with rocks or cement. The study fails to address the comparison of the benefits of the project against the long term benefits of implementing a project that would have lasting effects to the aid or present and future generations. The $12.9 billion may be better spent to fund an orderly retreat from the coast, helping people adjust to the coming waters, and coastal restoration that would truly make a difference for generations to come, like opening Bayou Lafourche as soon as possible to restore the delta, closing the Houma Navigation Canal, and diverting some Atchafalaya River water to combat coastal erosion and relative sea level rise.

BASIN5

BASIN6

BASIN7

The fact that the population for the project area is expected to increase overall reflects the negligent handling by the State of Louisiana of the crisis of rising water levels and increased frequency and intensity of flooding. With the rate at which we are losing our coast and the predicted sea level rise, the State of Louisiana should be working to depopulate the area and discourage further development along the coast.

BASIN8

The EIS should include the cumulative impacts, including several ring levees that have been permitted through the 404 process in the area north of Lake Boudreaux and would directly and indirectly impact the bottomland hardwood forest in the area. Although these ring levees are not part of the Morganza to the Gulf project, the habitat damages they cause should be considered in addition to the negative impacts caused by the preferred alignment because they are within the project area.

BASIN9

Sincerely,

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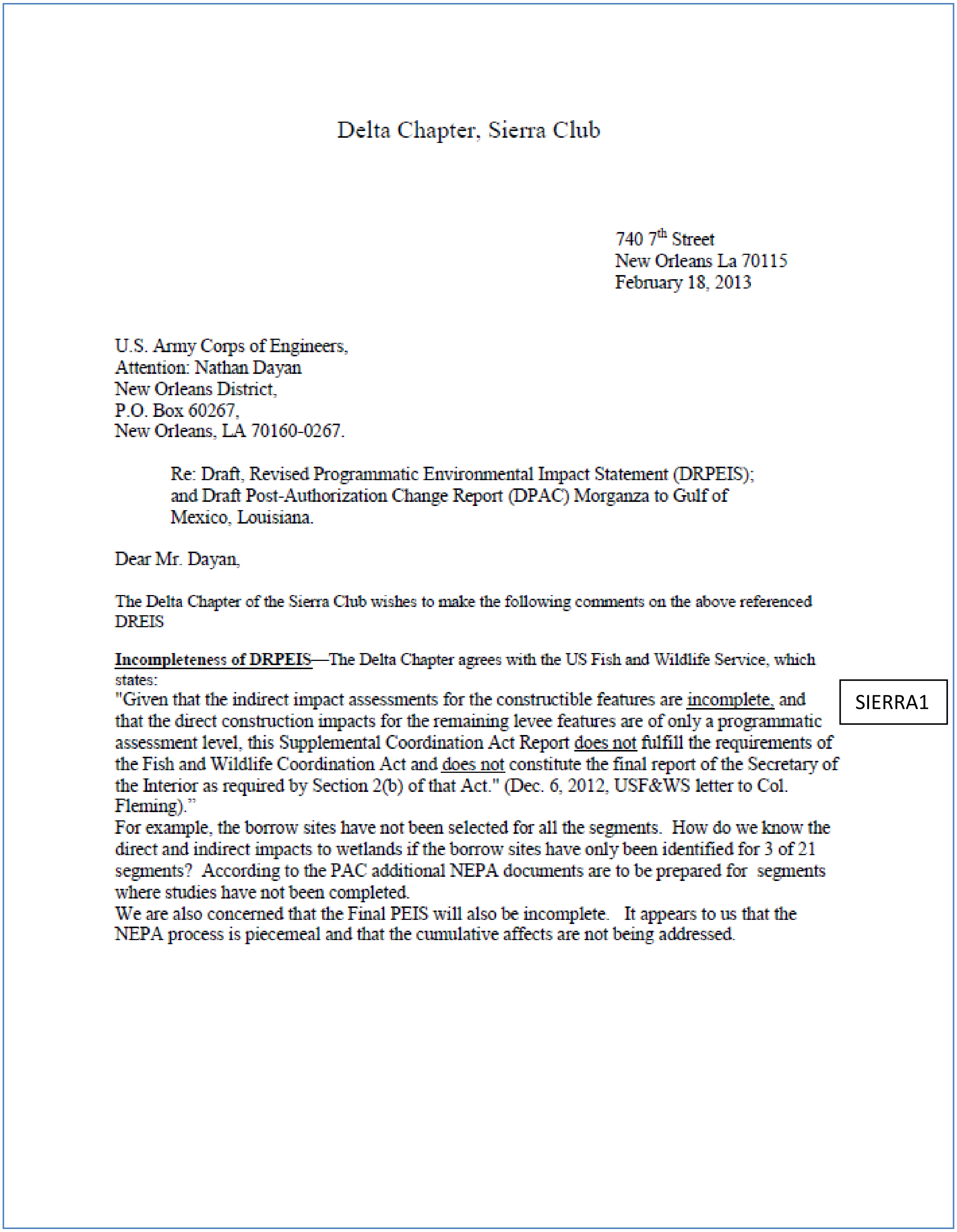


Delta Chapter, Sierra Club

740 7th Street
New Orleans La 70115
February 18, 2013

U.S. Army Corps of Engineers,
Attention: Nathan Dayan
New Orleans District,
P.O. Box 60267,
New Orleans, LA 70160-0267.

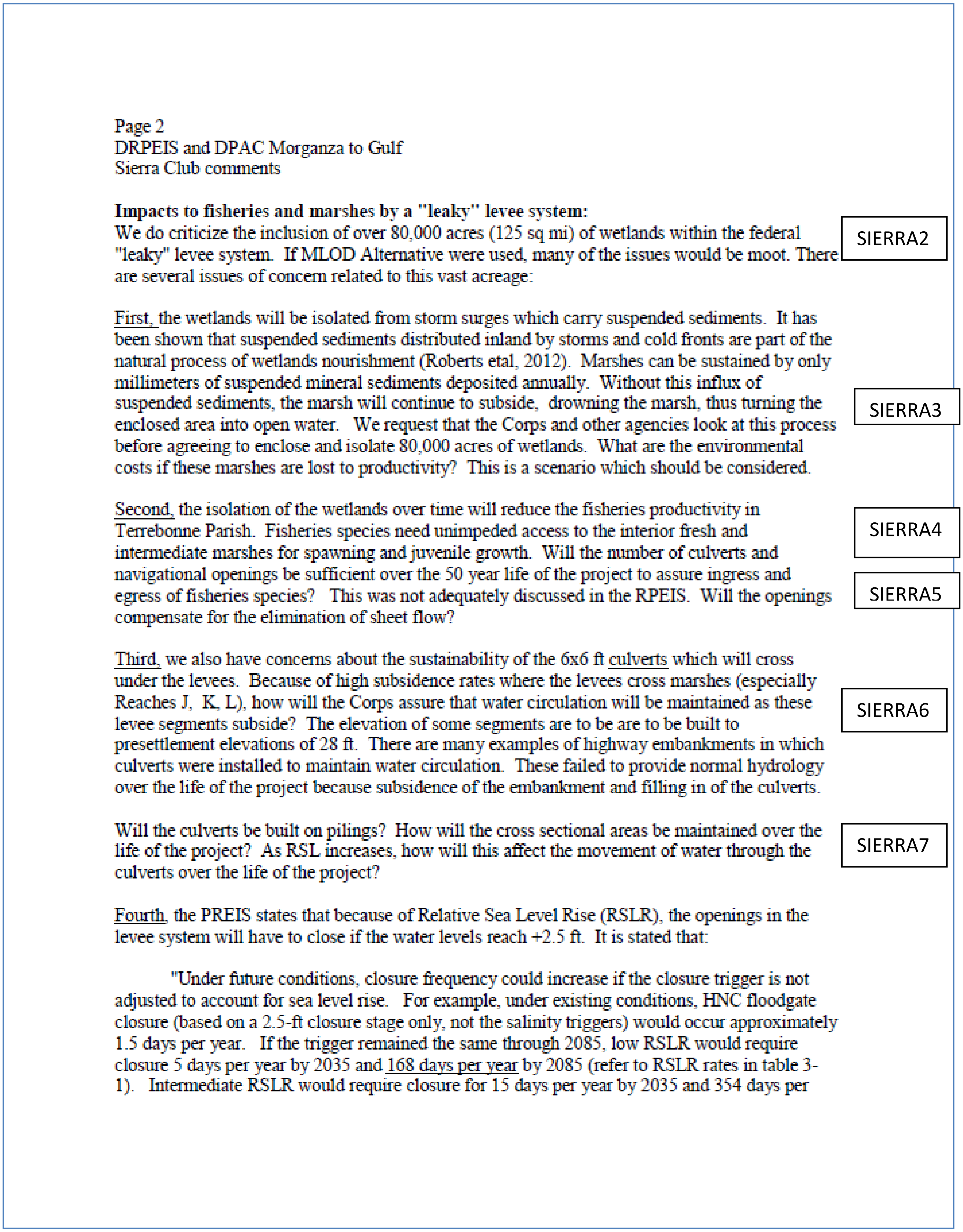
Re: Draft, Revised Programmatic Environmental Impact Statement (DRPEIS); and Draft Post-Authorization Change Report (DPAC) Morganza to Gulf of Mexico, Louisiana.

Dear Mr. Dayan,

The Delta Chapter of the Sierra Club wishes to make the following comments on the above referenced DREIS

SIERRA1

Incompleteness of DRPEIS—The Delta Chapter agrees with the US Fish and Wildlife Service, which states:
"Given that the indirect impact assessments for the constructible features are incomplete, and that the direct construction impacts for the remaining levee features are of only a programmatic assessment level, this Supplemental Coordination Act Report does not fulfill the requirements of the Fish and Wildlife Coordination Act and does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of that Act." (Dec. 6, 2012, USF&WS letter to Col. Fleming)."
For example, the borrow sites have not been selected for all the segments. How do we know the direct and indirect impacts to wetlands if the borrow sites have only been identified for 3 of 21 segments? According to the PAC additional NEPA documents are to be prepared for segments where studies have not been completed.
We are also concerned that the Final PEIS will also be incomplete. It appears to us that the NEPA process is piecemeal and that the cumulative affects are not being addressed.



Page 2
DRPEIS and DPAC Morganza to Gulf
Sierra Club comments

Impacts to fisheries and marshes by a "leaky" levee system:
We do criticize the inclusion of over 80,000 acres (125 sq mi) of wetlands within the federal "leaky" levee system. If MLOD Alternative were used, many of the issues would be moot. There are several issues of concern related to this vast acreage:

SIERRA2

First, the wetlands will be isolated from storm surges which carry suspended sediments. It has been shown that suspended sediments distributed inland by storms and cold fronts are part of the natural process of wetlands nourishment (Roberts etal, 2012). Marshes can be sustained by only millimeters of suspended mineral sediments deposited annually. Without this influx of suspended sediments, the marsh will continue to subside, drowning the marsh, thus turning the enclosed area into open water. We request that the Corps and other agencies look at this process before agreeing to enclose and isolate 80,000 acres of wetlands. What are the environmental costs if these marshes are lost to productivity? This is a scenario which should be considered.

SIERRA3

Second, the isolation of the wetlands over time will reduce the fisheries productivity in Terrebonne Parish. Fisheries species need unimpeded access to the interior fresh and intermediate marshes for spawning and juvenile growth. Will the number of culverts and navigational openings be sufficient over the 50 year life of the project to assure ingress and egress of fisheries species? This was not adequately discussed in the RPEIS. Will the openings compensate for the elimination of sheet flow?

SIERRA4

SIERRA5

Third, we also have concerns about the sustainability of the 6x6 ft culverts which will cross under the levees. Because of high subsidence rates where the levees cross marshes (especially Reaches J, K, L), how will the Corps assure that water circulation will be maintained as these levee segments subside? The elevation of some segments are to be are to be built to presettlement elevations of 28 ft. There are many examples of highway embankments in which culverts were installed to maintain water circulation. These failed to provide normal hydrology over the life of the project because subsidence of the embankment and filling in of the culverts.

SIERRA6

Will the culverts be built on pilings? How will the cross sectional areas be maintained over the life of the project? As RSL increases, how will this affect the movement of water through the culverts over the life of the project?

SIERRA7

Fourth, the PREIS states that because of Relative Sea Level Rise (RSLR), the openings in the levee system will have to close if the water levels reach +2.5 ft. It is stated that:

"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).

SIERRA8

"Environmental control structures will be closed for storm surge control if:

1. The water surface elevation on the staff gage reaches +2.5 feet NAVD88 at the flood gates when there is a named tropical storm in the Gulf.
2. If the National Weather Service issues a hurricane warning for the project area, the gates will be closed, if they have not already been closed due to condition (1) above." USACE (2013b, p. 80).

If the system must remain closed for even 24 days per year, what affect will this have on fisheries? If the closure comes at critical times for migrating fisheries how will this affect the productivity of the Terrebonne marshes?

"The trigger elevation may vary at different structure locations and will be further refined in the final PAC report." This information should have been included in the DRPEIS.

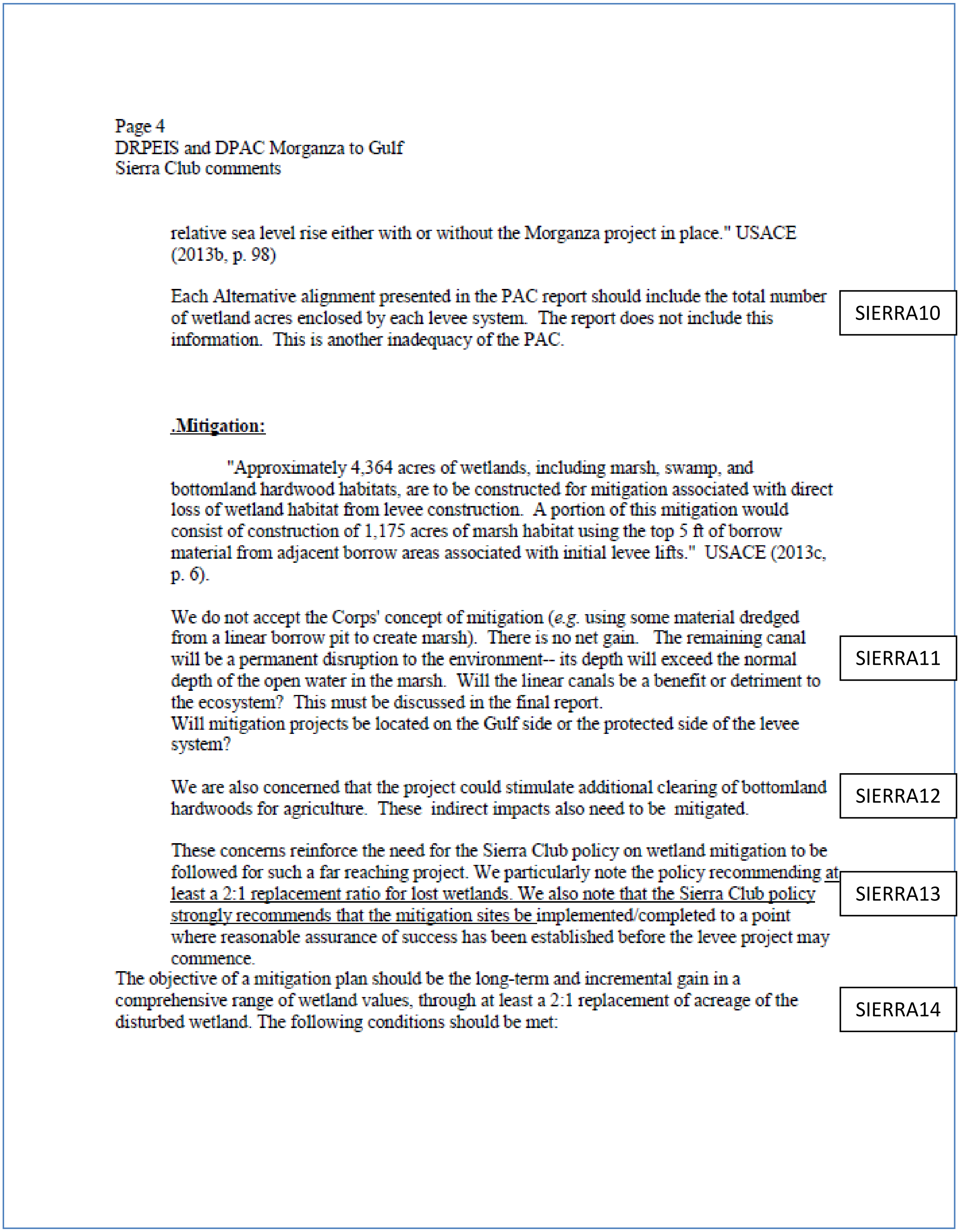
The USF&WS (2012, p.2) in a letter to Col. Fleming raised issues with the closure and its impacts on fisheries resources: "Because of potential future sea level rise, the revised operational criteria may result in increasing closure frequency and duration over time, and corresponding increases in fisheries access impacts." (USFWS, 2012, letter, p.2)

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 problem if less wetlands were included within the levee system as recommended in MLOD (Alternative 3).

The document states that there are 4,113 acres directly impacted by the construction of the TSP levee system. Does the levee footprint include: 1) the width of the borrow canal? 2) the offset between the berm and the borrow canal? 3) A 50 ft buffer zone from toe of slope? The entire impacted footprint of each levee section must be included as part of the direct impacts and wetland losses.

SIERRA9

"Creation of impounded wetlands with induced development and indirect impacts (flooding/freshwater into wetlands) has been and continues to be a controversial issue within the environmental community of Southern Louisiana. Maintaining ecosystem hydrology with drainage structures within the levee could be challenging in the future given some sea level rise scenarios. The issue is further exacerbated by the continued subsidence of the marsh lands; however, the wetland ecosystem will be impacted by



relative sea level rise either with or without the Morganza project in place." USACE (2013b, p. 98)

Each Alternative alignment presented in the PAC report should include the total number of wetland acres enclosed by each levee system. The report does not include this information. This is another inadequacy of the PAC.

SIERRA10

.Mitigation:

"Approximately 4,364 acres of wetlands, including marsh, swamp, and bottomland hardwood habitats, are to be constructed for mitigation associated with direct loss of wetland habitat from levee construction. A portion of this mitigation would consist of construction of 1,175 acres of marsh habitat using the top 5 ft of borrow material from adjacent borrow areas associated with initial levee lifts." USACE (2013c, p. 6).

We do not accept the Corps' concept of mitigation (*e.g.* using some material dredged from a linear borrow pit to create marsh). There is no net gain. The remaining canal will be a permanent disruption to the environment-- its depth will exceed the normal depth of the open water in the marsh. Will the linear canals be a benefit or detriment to the ecosystem? This must be discussed in the final report.
Will mitigation projects be located on the Gulf side or the protected side of the levee system?

SIERRA11

We are also concerned that the project could stimulate additional clearing of bottomland hardwoods for agriculture. These indirect impacts also need to be mitigated.

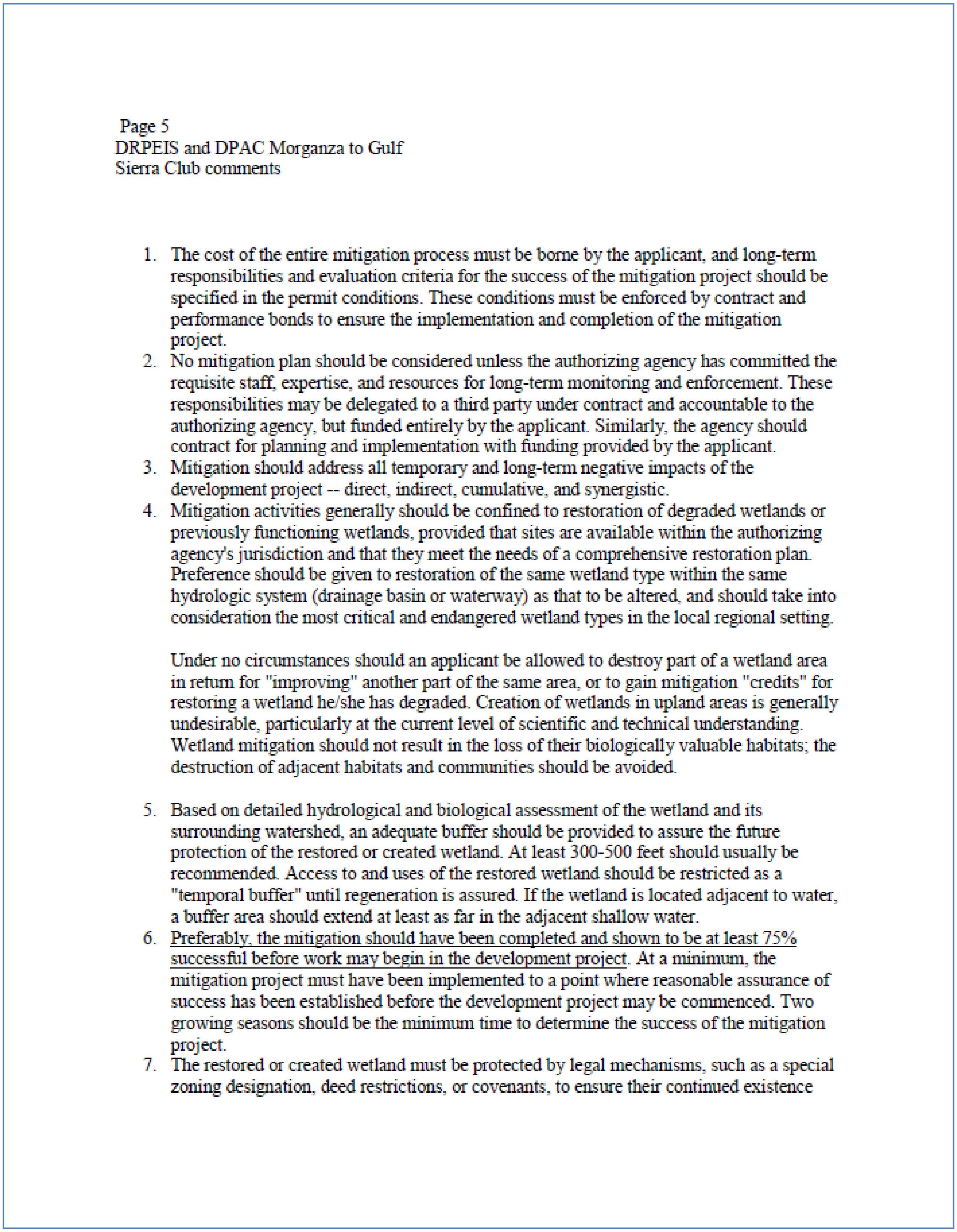
SIERRA12

These concerns reinforce the need for the Sierra Club policy on wetland mitigation to be followed for such a far reaching project. We particularly note the policy recommending at least a 2:1 replacement ratio for lost wetlands. We also note that the Sierra Club policy strongly recommends that the mitigation sites be implemented/completed to a point where reasonable assurance of success has been established before the levee project may commence.

SIERRA13

The objective of a mitigation plan should be the long-term and incremental gain in a comprehensive range of wetland values, through at least a 2:1 replacement of acreage of the disturbed wetland. The following conditions should be met:

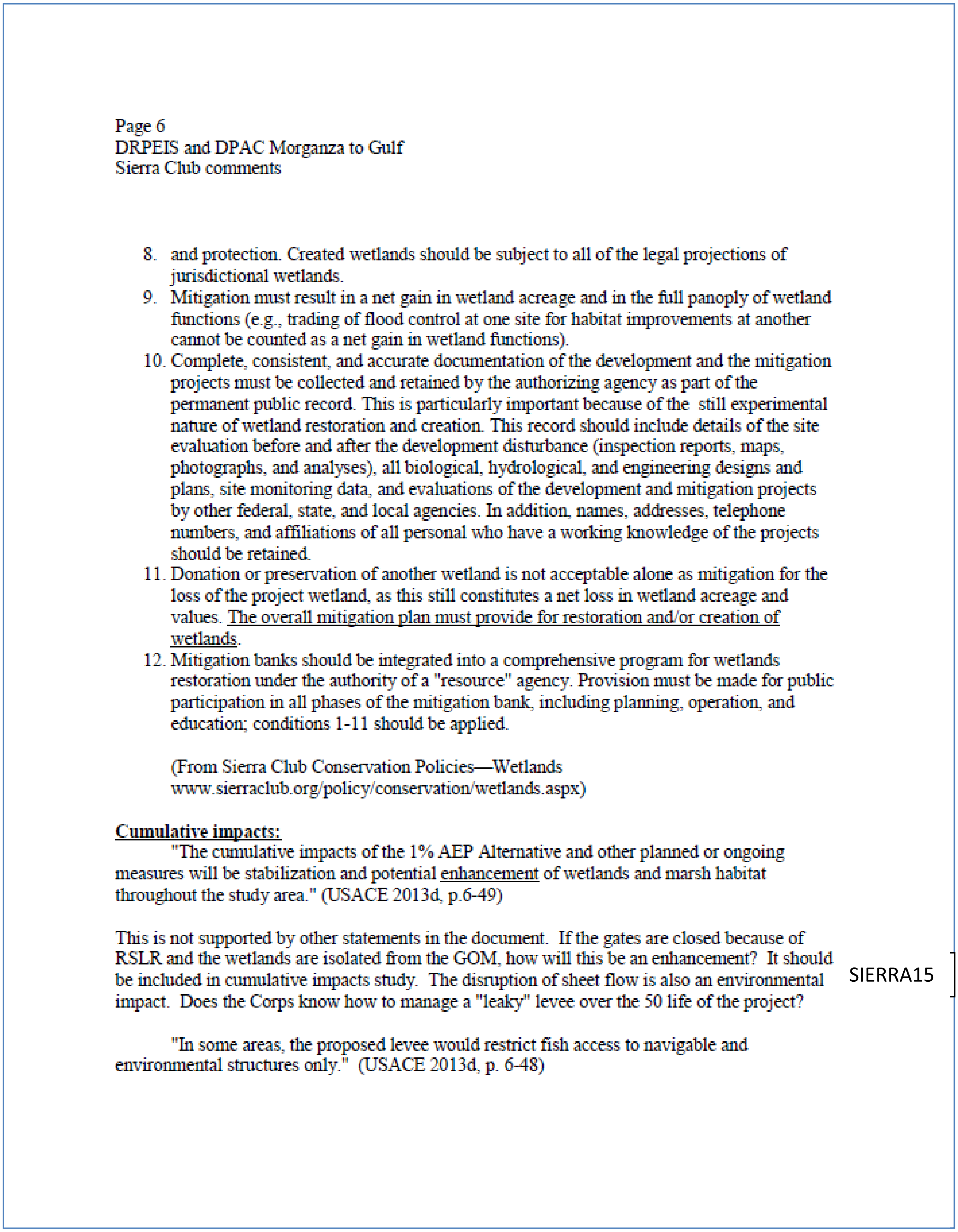
SIERRA14



1. The cost of the entire mitigation process must be borne by the applicant, and long-term responsibilities and evaluation criteria for the success of the mitigation project should be specified in the permit conditions. These conditions must be enforced by contract and performance bonds to ensure the implementation and completion of the mitigation project.
2. No mitigation plan should be considered unless the authorizing agency has committed the requisite staff, expertise, and resources for long-term monitoring and enforcement. These responsibilities may be delegated to a third party under contract and accountable to the authorizing agency, but funded entirely by the applicant. Similarly, the agency should contract for planning and implementation with funding provided by the applicant.
3. Mitigation should address all temporary and long-term negative impacts of the development project -- direct, indirect, cumulative, and synergistic.
4. Mitigation activities generally should be confined to restoration of degraded wetlands or previously functioning wetlands, provided that sites are available within the authorizing agency's jurisdiction and that they meet the needs of a comprehensive restoration plan. Preference should be given to restoration of the same wetland type within the same hydrologic system (drainage basin or waterway) as that to be altered, and should take into consideration the most critical and endangered wetland types in the local regional setting.

   Under no circumstances should an applicant be allowed to destroy part of a wetland area in return for "improving" another part of the same area, or to gain mitigation "credits" for restoring a wetland he/she has degraded. Creation of wetlands in upland areas is generally undesirable, particularly at the current level of scientific and technical understanding. Wetland mitigation should not result in the loss of their biologically valuable habitats; the destruction of adjacent habitats and communities should be avoided.

5. Based on detailed hydrological and biological assessment of the wetland and its surrounding watershed, an adequate buffer should be provided to assure the future protection of the restored or created wetland. At least 300-500 feet should usually be recommended. Access to and uses of the restored wetland should be restricted as a "temporal buffer" until regeneration is assured. If the wetland is located adjacent to water, a buffer area should extend at least as far in the adjacent shallow water.
6. Preferably, the mitigation should have been completed and shown to be at least 75% successful before work may begin in the development project. At a minimum, the mitigation project must have been implemented to a point where reasonable assurance of success has been established before the development project may be commenced. Two growing seasons should be the minimum time to determine the success of the mitigation project.
7. The restored or created wetland must be protected by legal mechanisms, such as a special zoning designation, deed restrictions, or covenants, to ensure their continued existence



8. and protection. Created wetlands should be subject to all of the legal projections of jurisdictional wetlands.
9. Mitigation must result in a net gain in wetland acreage and in the full panoply of wetland functions (e.g., trading of flood control at one site for habitat improvements at another cannot be counted as a net gain in wetland functions).
10. Complete, consistent, and accurate documentation of the development and the mitigation projects must be collected and retained by the authorizing agency as part of the permanent public record. This is particularly important because of the still experimental nature of wetland restoration and creation. This record should include details of the site evaluation before and after the development disturbance (inspection reports, maps, photographs, and analyses), all biological, hydrological, and engineering designs and plans, site monitoring data, and evaluations of the development and mitigation projects by other federal, state, and local agencies. In addition, names, addresses, telephone numbers, and affiliations of all personal who have a working knowledge of the projects should be retained.
11. Donation or preservation of another wetland is not acceptable alone as mitigation for the loss of the project wetland, as this still constitutes a net loss in wetland acreage and values. <u>The overall mitigation plan must provide for restoration and/or creation of wetlands</u>.
12. Mitigation banks should be integrated into a comprehensive program for wetlands restoration under the authority of a "resource" agency. Provision must be made for public participation in all phases of the mitigation bank, including planning, operation, and education; conditions 1-11 should be applied.

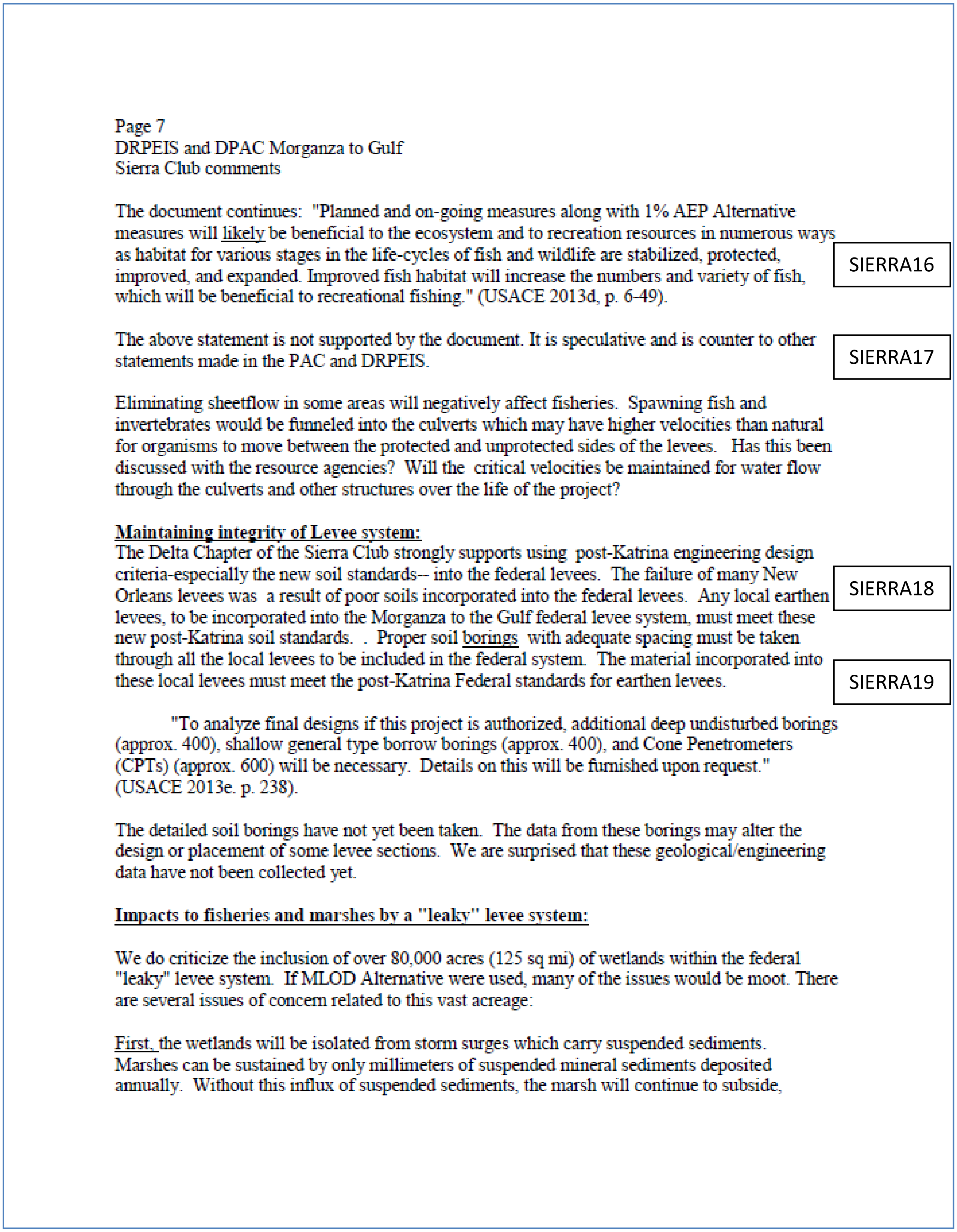
(From Sierra Club Conservation Policies—Wetlands
www.sierraclub.org/policy/conservation/wetlands.aspx)

<u>Cumulative impacts:</u>

"The cumulative impacts of the 1% AEP Alternative and other planned or ongoing measures will be stabilization and potential <u>enhancement</u> of wetlands and marsh habitat throughout the study area." (USACE 2013d, p.6-49)

This is not supported by other statements in the document. If the gates are closed because of RSLR and the wetlands are isolated from the GOM, how will this be an enhancement? It should be included in cumulative impacts study. The disruption of sheet flow is also an environmental impact. Does the Corps know how to manage a "leaky" levee over the 50 life of the project? SIERRA15

"In some areas, the proposed levee would restrict fish access to navigable and environmental structures only." (USACE 2013d, p. 6-48)



The document continues: "Planned and on-going measures along with 1% AEP Alternative measures will likely be beneficial to the ecosystem and to recreation resources in numerous ways as habitat for various stages in the life-cycles of fish and wildlife are stabilized, protected, improved, and expanded. Improved fish habitat will increase the numbers and variety of fish, which will be beneficial to recreational fishing." (USACE 2013d, p. 6-49).

SIERRA16

The above statement is not supported by the document. It is speculative and is counter to other statements made in the PAC and DRPEIS.

SIERRA17

Eliminating sheetflow in some areas will negatively affect fisheries. Spawning fish and invertebrates would be funneled into the culverts which may have higher velocities than natural for organisms to move between the protected and unprotected sides of the levees. Has this been discussed with the resource agencies? Will the critical velocities be maintained for water flow through the culverts and other structures over the life of the project?

Maintaining integrity of Levee system:

The Delta Chapter of the Sierra Club strongly supports using 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 levees. Any local earthen levees, to be incorporated into the Morganza to the Gulf federal levee system, must meet these new post-Katrina soil standards. . Proper soil borings with adequate spacing must be taken through all the local levees to be included in the federal system. The material incorporated into these local levees must meet the post-Katrina Federal standards for earthen levees.

SIERRA18

SIERRA19

"To analyze final designs if this project is authorized, additional deep undisturbed borings (approx. 400), shallow general type borrow borings (approx. 400), and Cone Penetrometers (CPTs) (approx. 600) will be necessary. Details on this will be furnished upon request." (USACE 2013e. p. 238).

The detailed soil borings have not yet been taken. The data from these borings may alter the design or placement of some levee sections. We are surprised that these geological/engineering data have not been collected yet.

Impacts to fisheries and marshes by a "leaky" levee system:

We do criticize the inclusion of over 80,000 acres (125 sq mi) of wetlands within the federal "leaky" levee system. If MLOD Alternative were used, many of the issues would be moot. There are several issues of concern related to this vast acreage:

First, the wetlands will be isolated from storm surges which carry suspended sediments. Marshes can be sustained by only millimeters of suspended mineral sediments deposited annually. Without this influx of suspended sediments, the marsh will continue to subside, drowning the marsh, thus turning the enclosed area into open water. We request that the Corps and other agencies look at this process before agreeing to enclose and isolate 80,000 acres of wetlands. What are the environmental costs if these marshes are lost to productivity? This is a scenario which should be considered.

Second, the isolation of the wetlands over time will reduce the fisheries productivity in Terrebonne Parish. Fisheries species need unimpeded access to the interior fresh and intermediate marshes for spawning and juvenile growth. Will the number of culverts and navigational openings be sufficient over the 50 year life of the project to assure ingress and egress of fisheries species? This was not adequately discussed in the RPEIS. Will the openings compensate for the elimination of sheet flow?

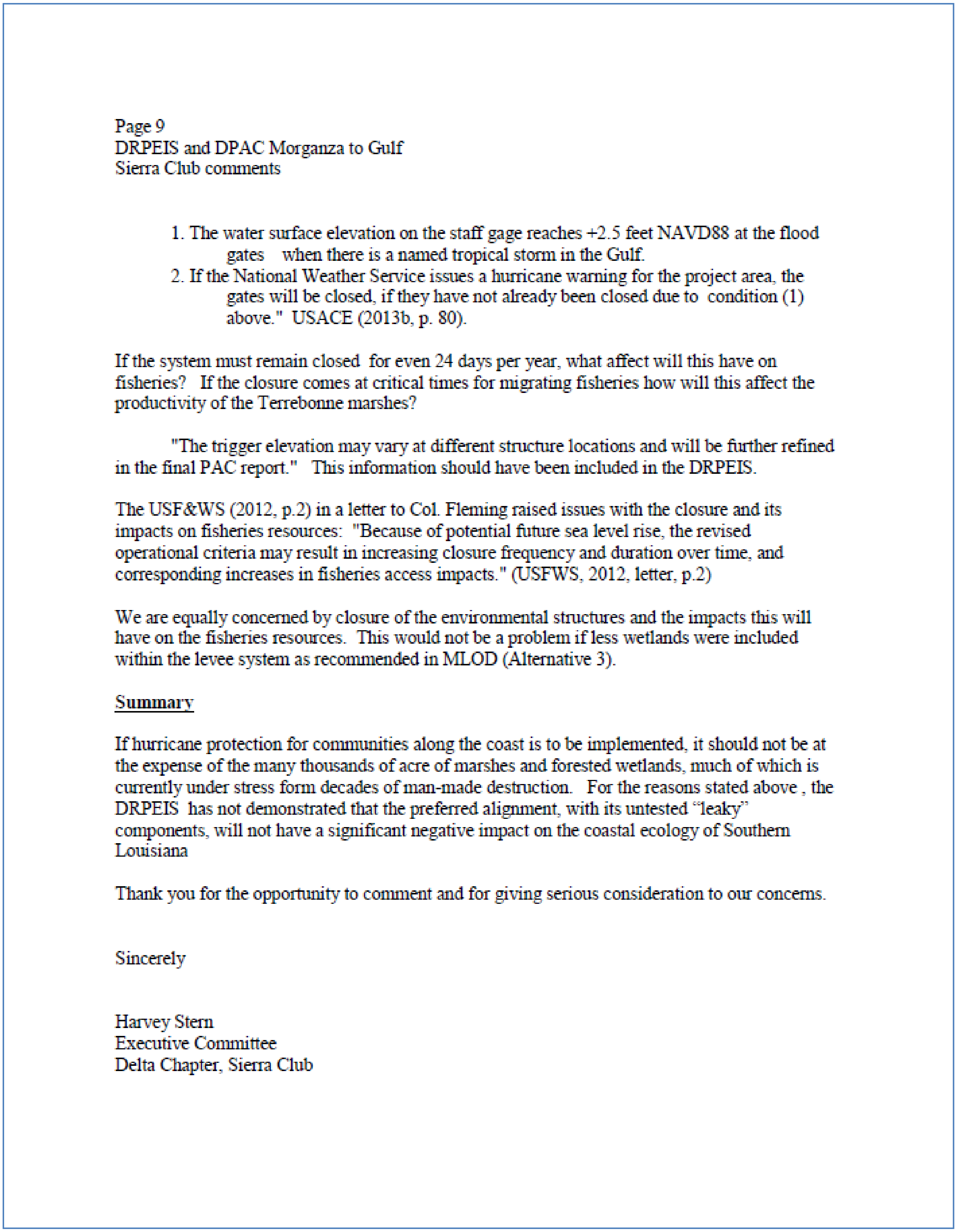
Third, The Sierra Club also has concerns about the sustainability of the 6x6 ft culverts which will cross under the levees. Because of high subsidence rates where the levees cross marshes (especially Reaches J, K, L), how will the Corps assure that water circulation will be maintained as these levee segments subside? The elevation of some segments are to be are to be built to presettlement elevations of 28 ft. There are many examples of highway embankments in which culverts were installed to maintain water circulation. These failed to provide normal hydrology over the life of the project because subsidence of the embankment and filling in of the culverts.

Will the culverts be built on pilings? How will the cross sectional areas be maintained over the life of the project? As RSL increases, how will this affect the movement of water through the culverts over the life of the project?

Fourth, the PREIS states that because of Relative Sea Level Rise (RSLR), the openings in the levee system will have to close if the water levels reach +2.5 ft. It is stated that:

"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).

"Environmental control structures will be closed for storm surge control if:



1. The water surface elevation on the staff gage reaches +2.5 feet NAVD88 at the flood gates when there is a named tropical storm in the Gulf.
2. If the National Weather Service issues a hurricane warning for the project area, the gates will be closed, if they have not already been closed due to condition (1) above." USACE (2013b, p. 80).

If the system must remain closed for even 24 days per year, what affect will this have on fisheries? If the closure comes at critical times for migrating fisheries how will this affect the productivity of the Terrebonne marshes?

"The trigger elevation may vary at different structure locations and will be further refined in the final PAC report." This information should have been included in the DRPEIS.

The USF&WS (2012, p.2) in a letter to Col. Fleming raised issues with the closure and its impacts on fisheries resources: "Because of potential future sea level rise, the revised operational criteria may result in increasing closure frequency and duration over time, and corresponding increases in fisheries access impacts." (USFWS, 2012, letter, p.2)

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 problem if less wetlands were included within the levee system as recommended in MLOD (Alternative 3).

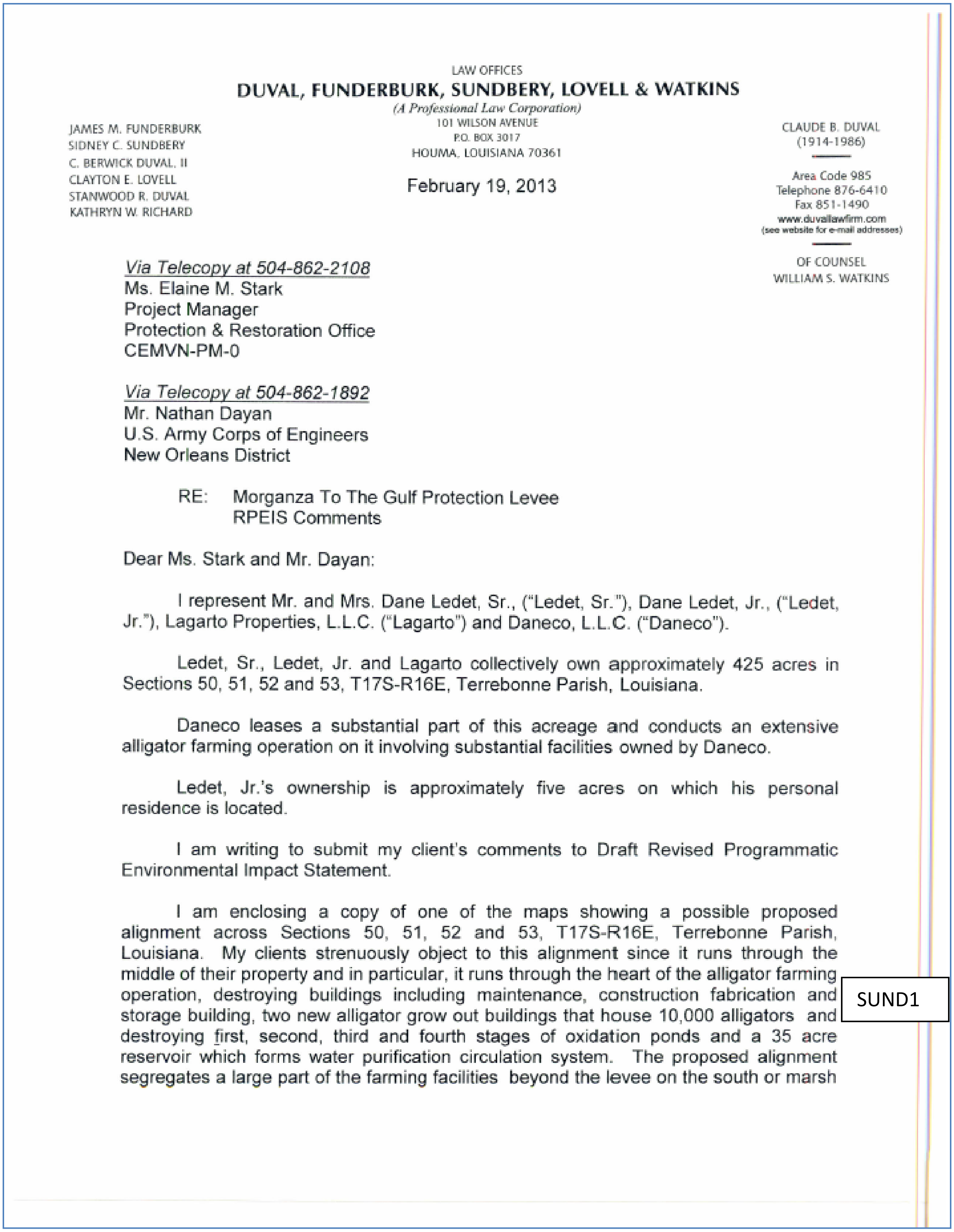
Summary

If hurricane protection for communities along the coast is to be implemented, it should not be at the expense of the many thousands of acre of marshes and forested wetlands, much of which is currently under stress form decades of man-made destruction. For the reasons stated above , the DRPEIS has not demonstrated that the preferred alignment, with its untested "leaky" components, will not have a significant negative impact on the coastal ecology of Southern Louisiana

Thank you for the opportunity to comment and for giving serious consideration to our concerns.

Sincerely

Harvey Stern
Executive Committee
Delta Chapter, Sierra Club



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OF COUNSEL
WILLIAM S. WATKINS

February 19, 2013

<u>Via Telecopy at 504-862-2108</u>
Ms. Elaine M. Stark
Project Manager
Protection & Restoration Office
CEMVN-PM-0

<u>Via Telecopy at 504-862-1892</u>
Mr. Nathan Dayan
U.S. Army Corps of Engineers
New Orleans District

RE: Morganza To The Gulf Protection Levee
RPEIS Comments

Dear Ms. Stark and Mr. Dayan:

I represent Mr. and Mrs. Dane Ledet, Sr., ("Ledet, Sr."), Dane Ledet, Jr., ("Ledet, Jr."), Lagarto Properties, L.L.C. ("Lagarto") and Daneco, L.L.C. ("Daneco").

Ledet, Sr., Ledet, Jr. and Lagarto collectively own approximately 425 acres in Sections 50, 51, 52 and 53, T17S-R16E, Terrebonne Parish, Louisiana.

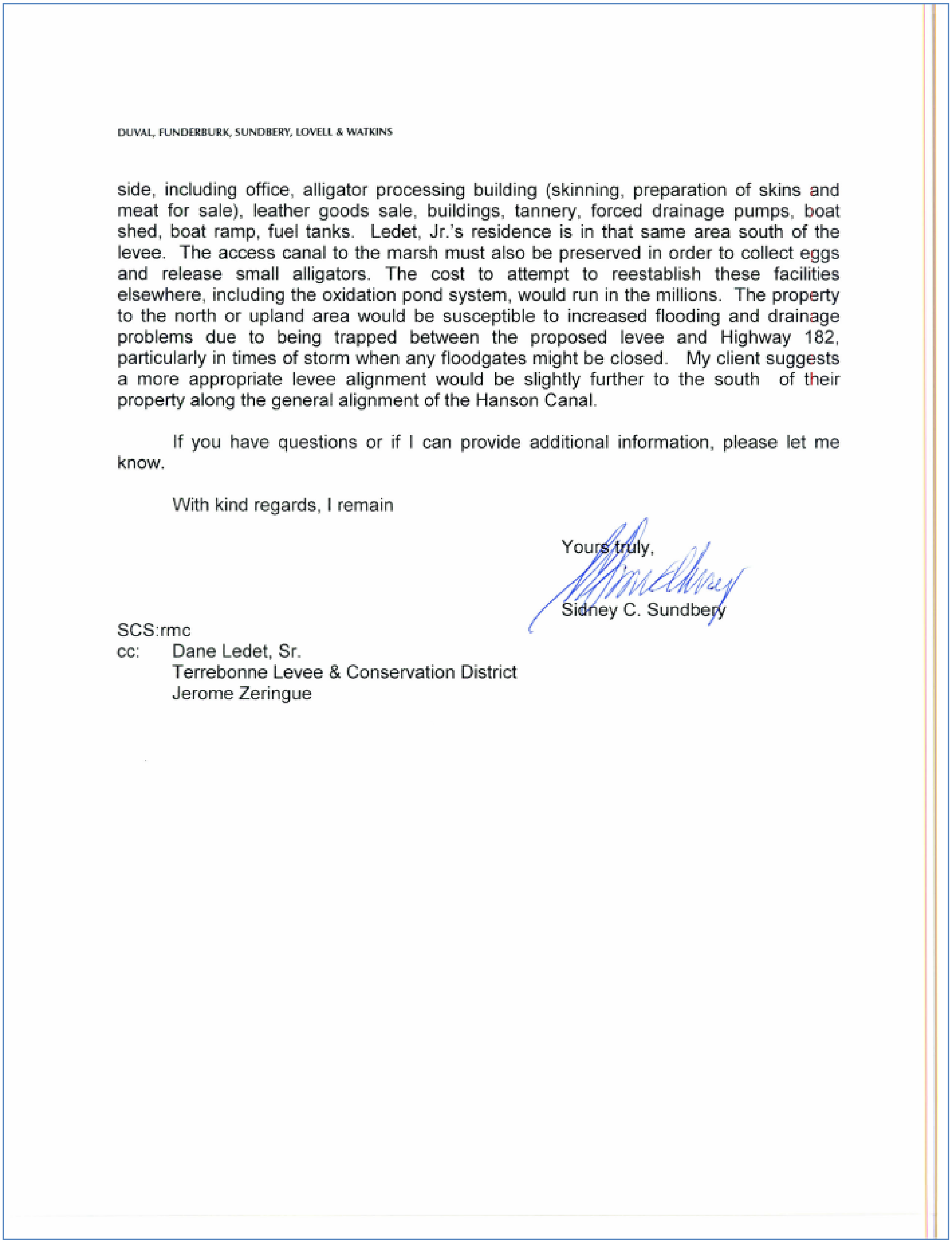
Daneco leases a substantial part of this acreage and conducts an extensive alligator farming operation on it involving substantial facilities owned by Daneco.

Ledet, Jr.'s ownership is approximately five acres on which his personal residence is located.

I am writing to submit my client's comments to Draft Revised Programmatic Environmental Impact Statement.

I am enclosing a copy of one of the maps showing a possible proposed alignment across Sections 50, 51, 52 and 53, T17S-R16E, Terrebonne Parish, Louisiana. My clients strenuously object to this alignment since it runs through the middle of their property and in particular, it runs through the heart of the alligator farming operation, destroying buildings including maintenance, construction fabrication and storage building, two new alligator grow out buildings that house 10,000 alligators and destroying first, second, third and fourth stages of oxidation ponds and a 35 acre reservoir which forms water purification circulation system. The proposed alignment segregates a large part of the farming facilities beyond the levee on the south or marsh

SUND1



side, including office, alligator processing building (skinning, preparation of skins and meat for sale), leather goods sale, buildings, tannery, forced drainage pumps, boat shed, boat ramp, fuel tanks. Ledet, Jr.'s residence is in that same area south of the levee. The access canal to the marsh must also be preserved in order to collect eggs and release small alligators. The cost to attempt to reestablish these facilities elsewhere, including the oxidation pond system, would run in the millions. The property to the north or upland area would be susceptible to increased flooding and drainage problems due to being trapped between the proposed levee and Highway 182, particularly in times of storm when any floodgates might be closed. My client suggests a more appropriate levee alignment would be slightly further to the south of their property along the general alignment of the Hanson Canal.

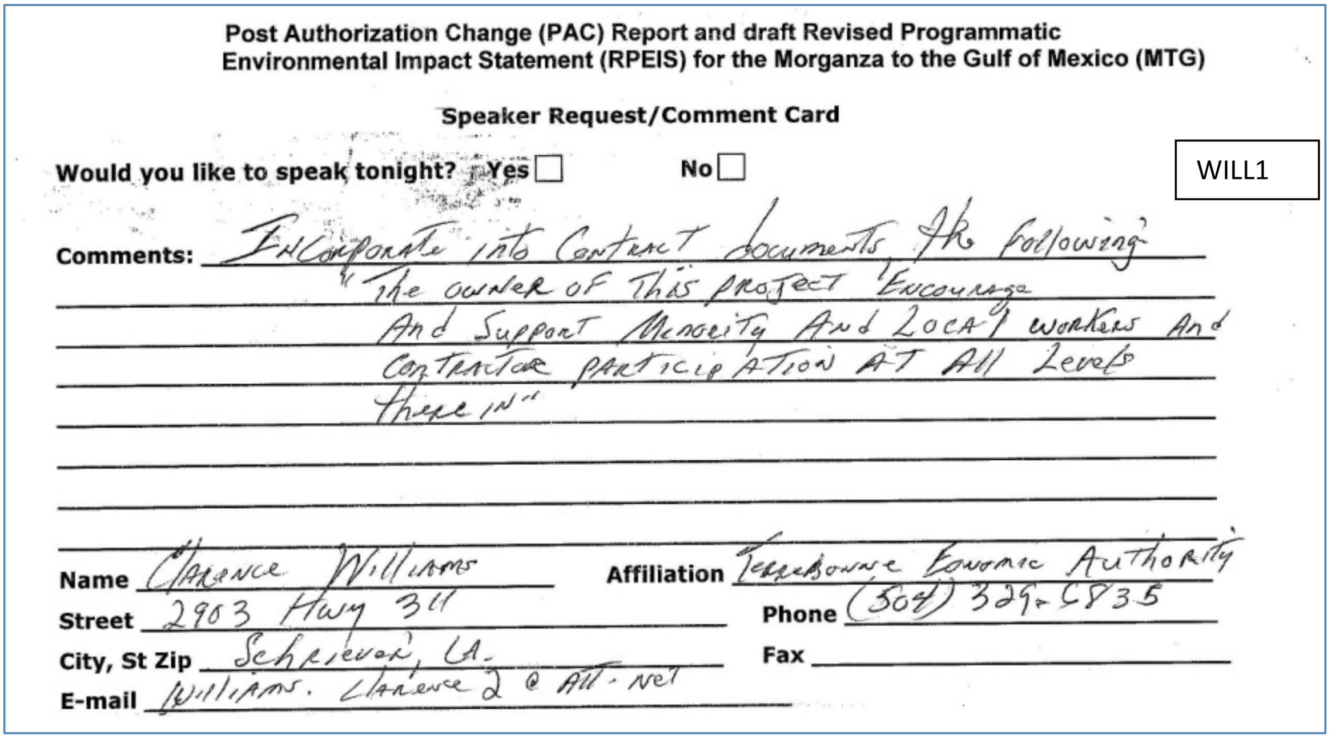
If you have questions or if I can provide additional information, please let me know.

With kind regards, I remain

Yours truly,

Sidney C. Sundbery

SCS:rmc
cc: Dane Ledet, Sr.
Terrebonne Levee & Conservation District
Jerome Zeringue



WILL1

Post Authorization Change (PAC) Report and draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Morganza to the Gulf of Mexico (MTG)

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☐

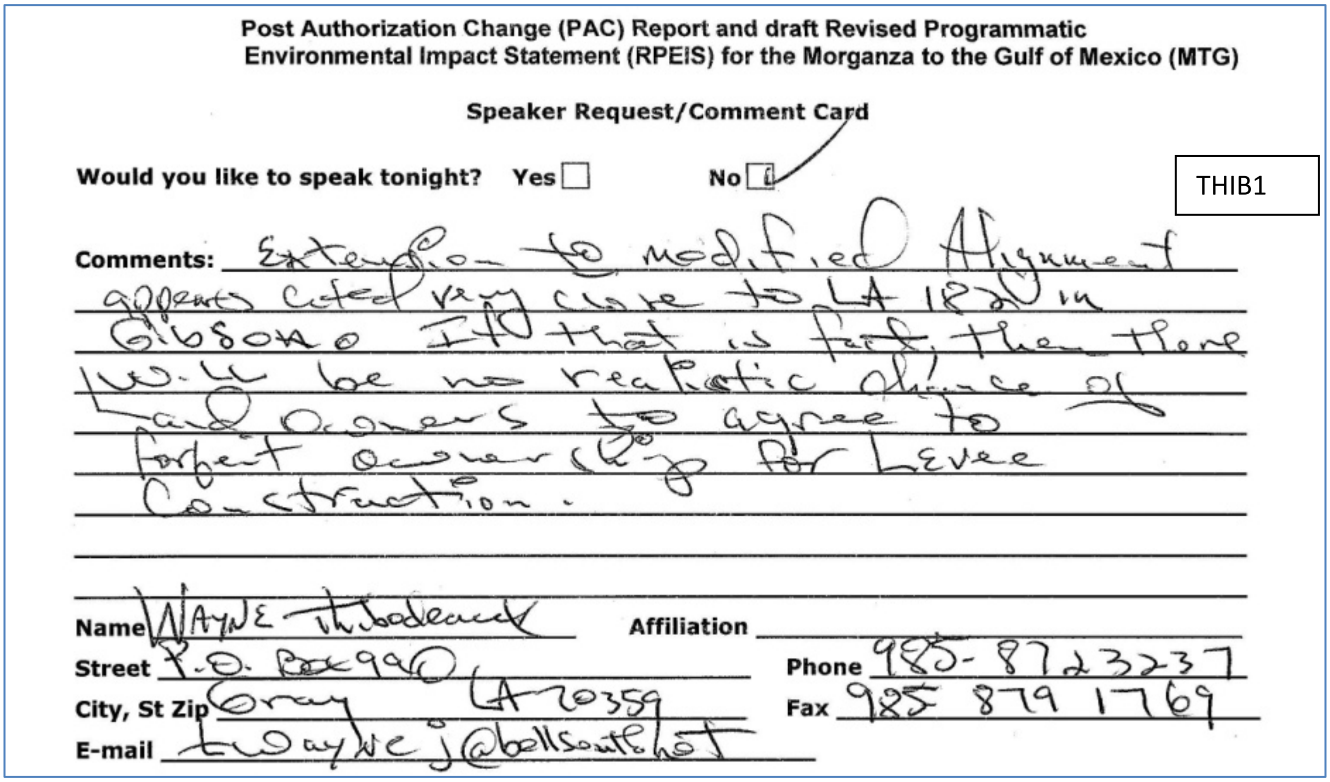
Comments: Incorporate into Contract documents, the following: "The owner of this project Encourage And Support Minority And Local workers And Contractor participation at All Levels there in"

Name Clarence Williams **Affiliation** Terrebonne Economic Authority

Street 2903 Hwy 311 **Phone** (504) 329-5835

City, St Zip Schriever, LA. **Fax**

E-mail Williams.Clarence2@Att.net



THIB1

Post Authorization Change (PAC) Report and draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Morganza to the Gulf of Mexico (MTG)

Speaker Request/Comment Card

Would you like to speak tonight? Yes ☐ No ☑

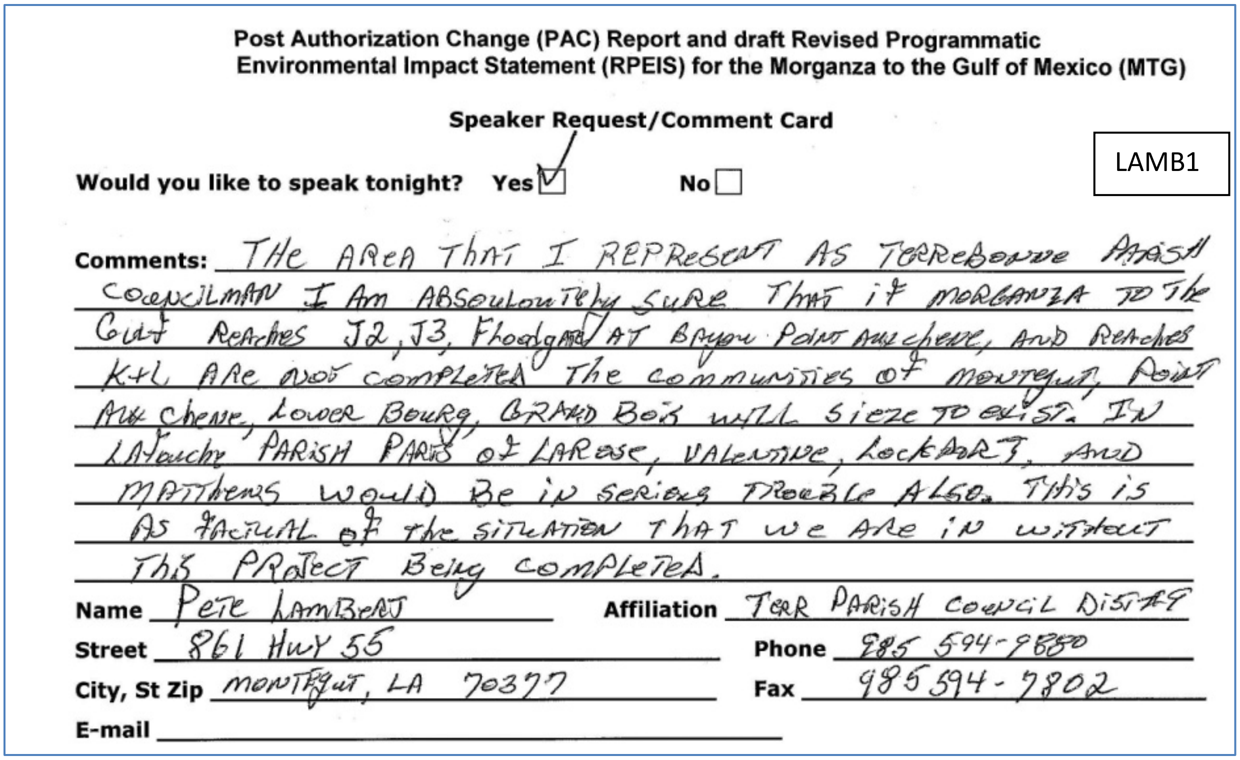
Comments: Extension to modified Alignment appears cited very close to LA 182 in Gibson. If that is fact, then there will be no realistic chance of Land Owners to agree to forfeit ownership for Levee Construction.

Name WAYNE Thibodeaux **Affiliation**

Street P.O. Box 990 **Phone** 985-872-3237

City, St Zip Gray LA 70359 **Fax** 985 879 1769

E-mail twaynej@bellsouth.net



Post Authorization Change (PAC) Report and draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Morganza to the Gulf of Mexico (MTG)

Speaker Request/Comment Card

LAMB1

Would you like to speak tonight? **Yes** ☑ **No** ☐

Comments: THE AREA THAT I REPRESENT AS TERREBONNE PARISH COUNCILMAN I AM ABSOULOUTELY SURE THAT IF MORGANZA TO THE GULF REACHES J2, J3, FLOODGATE AT BAYOU POINT AUX CHENE, AND REACHES K+L ARE NOT COMPLETED THE COMMUNITIES OF MONTEGUT, POINT AUX CHENE, LOWER BOURG, GRAND BOIS WILL SIEZE TO EXIST. IN LAFOUCHE PARISH PARTS OF LAROSE, VALENTINE, LOCKPORT, AND MATTHEWS WOULD BE IN SERIOUS TROUBLE ALSO. THIS IS AS FACTUAL OF THE SITUATION THAT WE ARE IN WITHOUT THIS PROJECT BEING COMPLETED.

Name PETE LAMBERT **Affiliation** TERR PARISH COUNCIL DIST #9

Street 861 HWY 55 **Phone** 985 594-9880

City, St Zip MONTEGUT, LA 70377 **Fax** 985 594-7802

E-mail

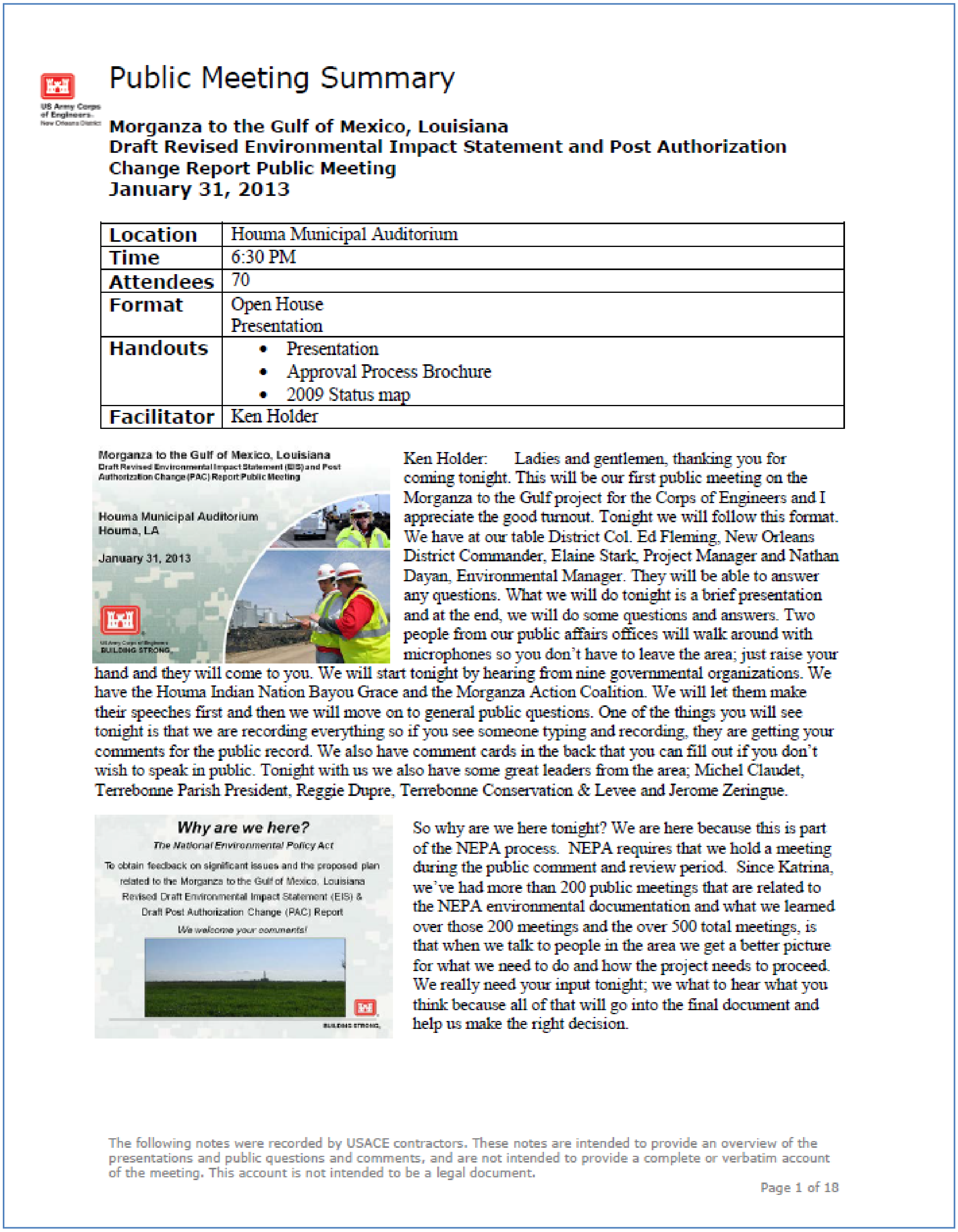
Public Comments

Phone conversation on 04 February 2013 with:

Mr. Chauvin
1. Very concerned – Lives in Houma has seen the changes over the past 75 years.
2. Supported that New Orleans got protection but now it is Houma's time. Needs to do something soon. Something is better than nothing – Protection levee needed.
3. If do nothing all the land will be gone.
4. Congressional action needed.

CHAU1

Public Meeting



Public Meeting Summary

Morganza to the Gulf of Mexico, Louisiana
Draft Revised Environmental Impact Statement and Post Authorization Change Report Public Meeting
January 31, 2013

Location	Houma Municipal Auditorium
Time	6:30 PM
Attendees	70
Format	Open House Presentation
Handouts	• Presentation • Approval Process Brochure • 2009 Status map
Facilitator	Ken Holder

Morganza to the Gulf of Mexico, Louisiana
Draft Revised Environmental Impact Statement (EIS) and Post Authorization Change (PAC) Report Public Meeting

Houma Municipal Auditorium
Houma, LA

January 31, 2013

US Army Corps of Engineers
BUILDING STRONG.

Ken Holder: Ladies and gentlemen, thanking you for coming tonight. This will be our first public meeting on the Morganza to the Gulf project for the Corps of Engineers and I appreciate the good turnout. Tonight we will follow this format. We have at our table District Col. Ed Fleming, New Orleans District Commander, Elaine Stark, Project Manager and Nathan Dayan, Environmental Manager. They will be able to answer any questions. What we will do tonight is a brief presentation and at the end, we will do some questions and answers. Two people from our public affairs offices will walk around with microphones so you don't have to leave the area; just raise your hand and they will come to you. We will start tonight by hearing from nine governmental organizations. We have the Houma Indian Nation Bayou Grace and the Morganza Action Coalition. We will let them make their speeches first and then we will move on to general public questions. One of the things you will see tonight is that we are recording everything so if you see someone typing and recording, they are getting your comments for the public record. We also have comment cards in the back that you can fill out if you don't wish to speak in public. Tonight with us we also have some great leaders from the area; Michel Claudet, Terrebonne Parish President, Reggie Dupre, Terrebonne Conservation & Levee and Jerome Zeringue.

Why are we here?

The National Environmental Policy Act

To obtain feedback on significant issues and the proposed plan related to the Morganza to the Gulf of Mexico, Louisiana Revised Draft Environmental Impact Statement (EIS) & Draft Post Authorization Change (PAC) Report

We welcome your comments!

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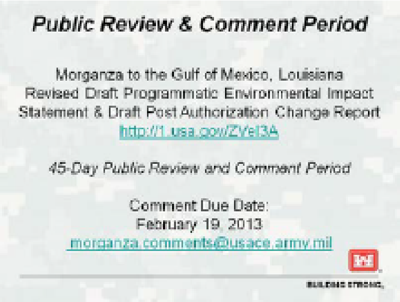
So why are we here tonight? We are here because this is part of the NEPA process. NEPA requires that we hold a meeting during the public comment and review period. Since Katrina, we've had more than 200 public meetings that are related to the NEPA environmental documentation and what we learned over those 200 meetings and the over 500 total meetings, is that when we talk to people in the area we get a better picture for what we need to do and how the project needs to proceed. We really need your input tonight; we what to hear what you think because all of that will go into the final document and help us make the right decision.

The following notes were recorded by USACE contractors. These notes are intended to provide an overview of the presentations and public questions and comments, and are not intended to provide a complete or verbatim account of the meeting. This account is not intended to be a legal document.



Public Review & Comment Period

Morganza to the Gulf of Mexico, Louisiana
Revised Draft Programmatic Environmental Impact
Statement & Draft Post Authorization Change Report
http://1.usa.gov/ZVeI3A

45-Day Public Review and Comment Period

Comment Due Date:
February 19, 2013
morganza.comments@usace.army.mil

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At the end of the slide presentation you will see and address where you can send information and there will also be a reference to our webpage. There is a 45-day period, we have until 19 February so it's been open for awhile, but you have until the 19th to make comments, but again you also have the opportunity to do that tonight. So before we begin with Col. Fleming, I would like to turn this over to President Claudet.

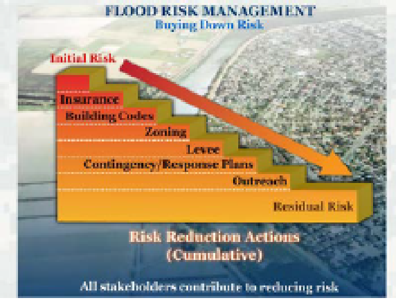
President Michel Claudet: I'm so proud for the turn out tonight and I wanted to recognize a few people in the crowd. We have Al Levron, the parish manager, Earl Eues, our Office of Emergency Preparedness Director and we have our parish council members Mr. Dirk Guidry, Mr. Danny Babin and Mr. Pete Lambert. We do have a number of levee district members who are here as well. We also have council members from Lafourche Parish; Mr. Phillip Goaux, Mr. Lindel Toups and former councilmember Bob Hale, Wayne Thibodeaux, former school board member Rickie Pitre. There is also Representative Gordon Doug, head of the Department of Natural Resources, Jerome Zeringue, head of CPRA, Garret Graves with the State of Louisiana and we have former representative, Mr. Juba Diaz. We also have the principal chief of the Houma United Nation, Mr. Thomas Dardar, Rebecca Templeton from Bayou Grace and Sharon Bergeron who has been working on the Morganza Action Coalition. As parish president, I can tell you this, we fight the good fight every day. We have difficulty on agreeing on things, we have difficulty on if our garbage should be picked up on Monday or Tuesday, but there is no doubt we all want levees as quick as we can get them, as high as we can get them and as strong as we can get them. We are all in unity on that and tonight is a great opportunity and we thank the Corps for coming to us with this report and we are very pleased it is here as this gives us many opportunities. They are here to accept comments from our people and as always in Terrebonne Parish, we want all our comments to be well thought out, respectful and concise. If you will, let's make certain that each of use the decorum that we are so well known for. By the way, Representative Lenore Whitney just walked in and we want to recognize that. Clarence Williams who is a member of TETA (Terrebonne Economic Development Authority) is also here. That being said we are going to give the meeting to Reggie and we will go forward.

Reggie Dupre: First I want to recognize three of my nine commissioners from the Terrebonne Levee District, Vice-President Leward "Sou" Henry, Carl Chauvin and Dennis Ledet. From my staff, Mitch Marmande is the program manager for Terrebonne Levee District and he works for T. Baker Smith but he spends 99% of his time working for us and the people of Terrebonne on all the technical issues and has done a fantastic job. I do want to thank the Corps and the people of Terrebonne for the turnout tonight and Lafourche citizens. I especially want to thank the federal project manager, Elaine Stark, who has spent at least four years of her life on this project learning everything about Terrebonne Parish and our needs for putting the project together. She has done a great job of putting all this together and basically this is round three for Morganza to the Gulf. First round was the reconnaissance study, which started in 1992. The second round was the feasibility study that started in '95 and ended in 2002 and signed by the chief of engineers. Then we were just waiting in limbo for Congress to act upon the chief's report and they didn't pass a bill until '07 when we got authorized. Because of the new post-Katrina design standards, the Corps was forced into looking at a much greater project and that is why the costs has increased from $888 million to $10.5 billion dollars. Elaine and the colonel, regardless of who comes to speak at this hearing, the true public hearing from Morganza was held on December 8, 2012, when 5,879 Terrebonne Parish voters voted yes to tax ourselves for a second time in 11 years for this project. So, we may argue about means and methods and we may argue about priorities and about standards, but the people of this parish want protection. We want protection and we are willing to put our own pocketbooks on the tablet o pay for it along with the state of Louisiana. Together, we have done a lot of protection, it's the longest alignment in the last several years and Jerome will be coming behind me, the executive director of the CPRA and was the prior director of the Terrebonne Levee District. I've already submitted written comments after reading through this massive authorization report and I've submitted some written comments, but the official comments from the non-federal partners have already been prepared and are being submitted by the two non-federal project managers, Mitch Marmande on behalf of the Terrebonne Levee District and James McMenis, the state project manager who works for Jerome. I will now call up Jerome Zeringue, the executive director of the Coastal Restoration and Protection Authority and our state partners and main non-federal sponsor for Morganza.

President Michel Claudet: I just want to mention two people I forgot, David Cavell from Congressman Cassidy and Denise Reed, she is the head scientist for the Water Institute.

Jerome Zeringue: It's been awhile and a long arduous road and I'm thinking about when I first started and got involved with the Levee District in '98. My son wasn't even born yet, he was born two weeks after I started, and he is now 14 going to be 15 and the project is still waiting for authorization. I think it's frustrating, and I know these folks here from the New Orleans District are working hard, but on behalf of the Governor's Office and Garrett to express our support, but I'm also here to obviously say that we would be remiss if we didn't say that we need to address the procedure, the policy and the process in implementing these projects. I know it's beyond the scope of the district and what they can and can't do, it's under congressional and federal level, but it speaks to the concern that we have in our ability to implement projects into the future and how we can be successful in providing protection of this coastal community need and one they obviously deserve. We are going to have to continue to work on trying to reduce the risk on these communities. We know we can't build the "Great Wall of Louisiana," even if we wanted to, even though the intention is not to do that. We need to build stronger, smarter and we need to build more resilient communities, but in doing so recognizing the fact that a community that has worked so hard and has committed in terms of the financial commitments stepped up to the plate to put up from their perspective a significant amount of dollars and commitment for this project and this speaks well for the community and is also indicative of the problems we face, and will face, into the future. Again, this process is important; we need to get this project authorized. It's encouraging because of the fact that it has a positive cost-benefit ratio and from the federal perspective that is significant. It has a positive cost-benefit ratio with costs that we believe are high and that we will continue to work with the New Orleans District, as we have and they will continue to work with us I'm sure, that we can reduce the overall cost and look at ways that we can provide the protection we are trying to achieve but do it in a manner that is more cost-effective and efficient and I encourage the Corps to continue working with the locals and the state to achieve that and I think we can do that. As demonstrated by the commitment of the locals, they are going to continue to build and the state will continue to support you guys in doing that and we are appreciative of the Corps coming here tonight but also encourage them to do what they can to implement this project, expedite as best they can and work on creating the efficiencies that we need so that we can build this project and get the protection this community deserves. Again, we thank you all for coming and look forward to working with you all and the locals to get it done.

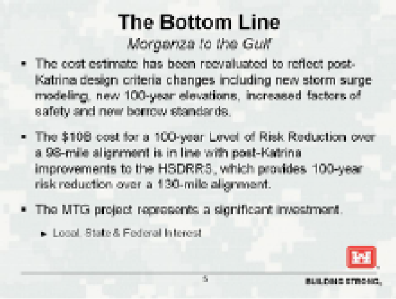
Col. Fleming: I'm not sure President Claudet introduced everyone; there were a couple of spiders running around the corner and he didn't introduce them. My name is Ed Fleming and I'm a colonel in the United States Army and I'm the district commander of the New Orleans District for the Army Corps of Engineers. Our responsibility, our footprint, goes all the way from the Pearl River in the east all the way past Cameron and Calcasieu Parish in the west, from the Gulf of Mexico in the south and up to Old River in the north. What does the district commander do? I'm responsible for everything that happens or fails to happen according to the Corps of Engineers within that footprint. So I'm here to spend some time to talk to you about his particular project and I'm so appreciative of the folks here in Houma and Terrebonne Parish for allowing us to come in and hosting us here. I love coming to Terrebonne, you not only TV stars but you also have movie stars too. Maybe you will see an Academy Award coming to Terrebonne Parish here in a couple weeks. It's a great value to the nation and I will highlight that in a couple of minutes. I'm going to say something that may surprise some folks, but a levee doesn't protect you. A levee doesn't protect your property. Prior to Hurricane Katrina, the levees that are around the New Orleans area were called the Hurricane Protection System, but a levee doesn't protect you nor does it protect your property. It reduces your risk and there are many risks and there are a lot of ways to reduce risks.


FLOOD RISK MANAGEMENT
Buying Down Risk

Risk Reduction Actions (Cumulative)

All stakeholders contribute to reducing risk

A way to reduce the risk due to damage from hurricanes is to have barrier islands. Another way to reduce the risk is to have coastal wetlands because they take the energy out from underneath the storm. Another way to reduce your risk is a levee, a floodwall, a gate or a pump station. Another way to reduce risks is to have your house built above the base flood elevation. Another way to reduce your risk is to have an evacuation plan. There are a lot of ways to reduce the risks you have due to the damage from the surge of a storm and a levee system is only one way to reduce that risk. What I'm showing here is that there are a lot of ways that we all share in reducing that risk. The federal government has a responsibility, the state has a responsibility, the parish clearly has a responsibility, all the zoning codes that have to go along with the way things are built here and then there is personal responsibility. A levee system is one of those ways that helps reduce the risk that you have to property damage from the surge from a storm.


The Bottom Line

Morganza to the Gulf

- The cost estimate has been reevaluated to reflect post-Katrina design criteria changes including new storm surge modeling, new 100-year elevations, increased factors of safety and new borrow standards.
- The $10B cost for a 100-year Level of Risk Reduction over a 98-mile alignment is in line with post-Katrina improvements to the HSDRRS, which provides 100-year risk reduction over a 130-mile alignment.
- The MTG project represents a significant investment.
  - Local, State & Federal Interest

5

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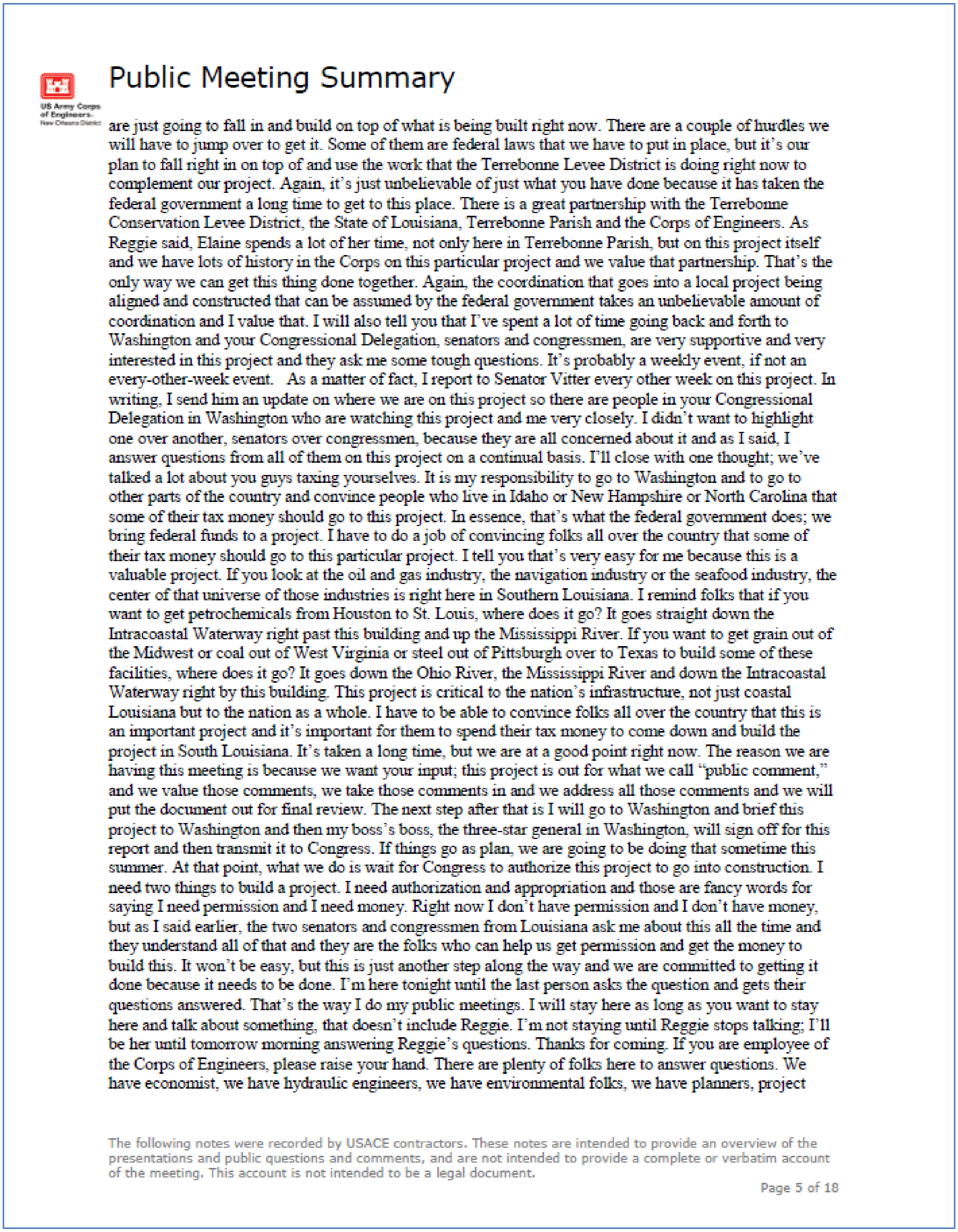
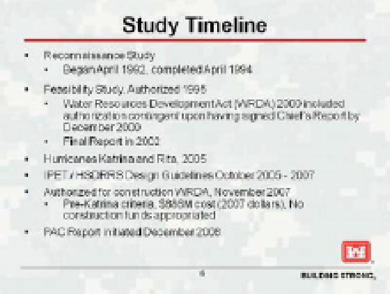
I think it's important to remember as there has been a lot of discussion in the level of risk reduction in comparing this system to what was built in the Greater New Orleans area. I'm here to tell you that there is no difference in what we are proposing and what was built in the Greater New Orleans area. Now we are looking at adjusting some of the design guidelines because there are a few differences in the geography. As you well know, this system is proposed to be built south of Lake Boudreaux so there is a lot of area of Lake Boudreaux to accept overtopping of water into Lake Boudreaux, which you don't have in Greater New Orleans. Many of the levees in Greater New Orleans are built right up on people's back yards so some of the standards have to be adjusted based on the site, based on the geography, so we will look at doing that. It is going to be a 100-system, what we call the 100-year storm or a 1% system, which is the exact same thing that we built in the Greater New Orleans area. So there is not this haves and have-nots, it's the exact same system. I have to applaud Reggie, the Terrebonne Levee District and Terrebonne Parish president as well as the folks in the parish. As Reggie said, you have voted twice to tax yourself. The solution to every problem is not a federal project. We talk a lot about people, I remember as a kid hearing someone say, "Don't make a federal project out of it," meaning don't take so long, don't make a big deal out of it. This is the definition of a federal project right here and we are going to get there, but in the meantime I can't believe the amount of work you have done and I have nothing but praise and thanks and appreciation for you for being to say, you know what, this is going to be a long time. We've got to study this, design this, get authorization for it, then we've got to get the money for it and then we going to start building it. We don't have that kind of time so we are going to build something on our own so the plans that you guys have, the Terrebonne Levee District, is along the same alignment so that when we come to build this, we



are just going to fall in and build on top of what is being built right now. There are a couple of hurdles we will have to jump over to get it. Some of them are federal laws that we have to put in place, but it's our plan to fall right in on top of and use the work that the Terrebonne Levee District is doing right now to complement our project. Again, it's just unbelievable of just what you have done because it has taken the federal government a long time to get to this place. There is a great partnership with the Terrebonne Conservation Levee District, the State of Louisiana, Terrebonne Parish and the Corps of Engineers. As Reggie said, Elaine spends a lot of her time, not only here in Terrebonne Parish, but on this project itself and we have lots of history in the Corps on this particular project and we value that partnership. That's the only way we can get this thing done together. Again, the coordination that goes into a local project being aligned and constructed that can be assumed by the federal government takes an unbelievable amount of coordination and I value that. I will also tell you that I've spent a lot of time going back and forth to Washington and your Congressional Delegation, senators and congressmen, are very supportive and very interested in this project and they ask me some tough questions. It's probably a weekly event, if not an every-other-week event. As a matter of fact, I report to Senator Vitter every other week on this project. In writing, I send him an update on where we are on this project so there are people in your Congressional Delegation in Washington who are watching this project and me very closely. I didn't want to highlight one over another, senators over congressmen, because they are all concerned about it and as I said, I answer questions from all of them on this project on a continual basis. I'll close with one thought; we've talked a lot about you guys taxing yourselves. It is my responsibility to go to Washington and to go to other parts of the country and convince people who live in Idaho or New Hampshire or North Carolina that some of their tax money should go to this project. In essence, that's what the federal government does; we bring federal funds to a project. I have to do a job of convincing folks all over the country that some of their tax money should go to this particular project. I tell you that's very easy for me because this is a valuable project. If you look at the oil and gas industry, the navigation industry or the seafood industry, the center of that universe of those industries is right here in Southern Louisiana. I remind folks that if you want to get petrochemicals from Houston to St. Louis, where does it go? It goes straight down the Intracoastal Waterway right past this building and up the Mississippi River. If you want to get grain out of the Midwest or coal out of West Virginia or steel out of Pittsburgh over to Texas to build some of these facilities, where does it go? It goes down the Ohio River, the Mississippi River and down the Intracoastal Waterway right by this building. This project is critical to the nation's infrastructure, not just coastal Louisiana but to the nation as a whole. I have to be able to convince folks all over the country that this is an important project and it's important for them to spend their tax money to come down and build the project in South Louisiana. It's taken a long time, but we are at a good point right now. The reason we are having this meeting is because we want your input; this project is out for what we call "public comment," and we value those comments, we take those comments in and we address all those comments and we will put the document out for final review. The next step after that is I will go to Washington and brief this project to Washington and then my boss's boss, the three-star general in Washington, will sign off for this report and then transmit it to Congress. If things go as plan, we are going to be doing that sometime this summer. At that point, what we do is wait for Congress to authorize this project to go into construction. I need two things to build a project. I need authorization and appropriation and those are fancy words for saying I need permission and I need money. Right now I don't have permission and I don't have money, but as I said earlier, the two senators and congressmen from Louisiana ask me about this all the time and they understand all of that and they are the folks who can help us get permission and get the money to build this. It won't be easy, but this is just another step along the way and we are committed to getting it done because it needs to be done. I'm here tonight until the last person asks the question and gets their questions answered. That's the way I do my public meetings. I will stay here as long as you want to stay here and talk about something, that doesn't include Reggie. I'm not staying until Reggie stops talking; I'll be her until tomorrow morning answering Reggie's questions. Thanks for coming. If you are employee of the Corps of Engineers, please raise your hand. There are plenty of folks here to answer questions. We have economist, we have hydraulic engineers, we have environmental folks, we have planners, project managers. We have a slew of folks here who can answer just about any question that you have and we are here and will stay here until the last person leaves. Thank you.

Elaine Stark: Good evening, I'm Elaine Stark and while everyone is thanking everyone, I need to thank the colonel, my division chief and everyone out there who selected me to work on this project because, they laugh at me back in New Orleans, but this is the best project on the district and it is a privilege for me to manage it. Some of us have careers in civil works, some of us do not, so I'm going to quickly run through where we've been with this project, where we are now and a little bit about our next steps.



Study Timeline

- Reconnaissance Study
    - Began April 1992, completed April 1994
- Feasibility Study Authorized 1995
    - Water Resources Development Act (WRDA) 2000 included authorization contingent upon having signed Chief's Report by December 2000
    - Final Report in 2002
- Hurricanes Katrina and Rita, 2005
- IPET / HSDRRS Design Guidelines October 2005 - 2007
- Authorized for construction WRDA, November 2007
    - Pre-Katrina criteria, $886M cost (2007 dollars), No construction funds appropriated
- PAC Report initiated December 2008

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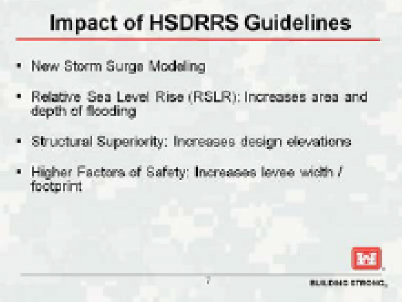
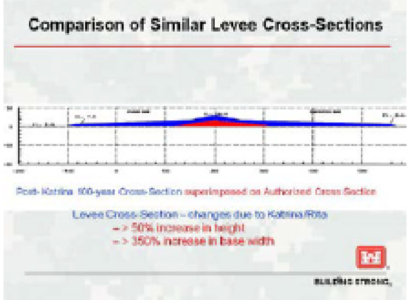
We started with the Reconnaissance Study, true or false, the Morganza has taken 20 year so far? Sadly, it's true. In 1992, we got a resolution by a house committee saying there may be a federal interest out there and go take a look. Corps of Engineers Reconnaissance Study is something the federal government funds 100% of. It's suppose to be a quick check, we don't do a lot of investigations as we use mostly existing information to determine whether or not it's worth it to go a little bit further. So we completed our recon study in 1994, it was favorable and showed there was a federal interest here in a federal project. Then we moved on to the feasibility study. The feasibility study had to be authorized by Congress and they wanted it so badly they didn't do it in a WRDA bill, which is typical, they did it in an appropriations bill back in 1995. We worked on that feasibility study for awhile as it's a very long alignment. The original authorized project that was based on a 2002 feasibility report and it was 72 miles long. It takes a long time and a lot of money to investigate the soil properties and the feasibility of building a project this large. So we started that back in 1995. The feasibility study is a higher level that costs more money, it's cost-shared 50-50 with a local sponsor. At that time, it was the Department of Transportation and Development for the State of Louisiana. It's a much more in-depth study where you get to a certain point where you look at the cost of the project versus the benefits of the project. This is your "go, no-go." That feasibility that we did, recommended a 100-year plan and we had a draft report ready in 2000. At that same time, Congress came through and provided a conditional authorization for a number of projects, but they said for Morganza to the Gulf, if you can get a signed sheets report up by the end of this year, your project is authorized. At that time we were at a draft stage, just like we are now with the post-authorization change report, but we didn't get it in by the end of 2000; we didn't get our final report up until 2002. It's very hard to predict from tonight how quickly we will move to the final report on the pact because we don't know the level of comments and input that we are going to get that may impact the future designs of the project. Anyway, we completed that feasibility study in 2002 and the chief's report went up recommending the project and we went to the waiting place, waiting for authorization. While we were in the waiting place, Hurricane Katrina and especially you all here, Rita, came through in 2005 and that was a game-changer for everyone, not just the people who lived in New Orleans. As a result of what happened in Katrina and Rita down here, there was a big study done, it was the Inter-Agency Performance Evaluation Task Force, IPET. This is a group of academics, industry leader and Corps and local and state government who came together and tried to put together a report on the lessons that we learned from those storms. Two of the big things that came out of that is that number one, we can't predict how deep storm surge is going to get based on the wind speed of a storm. If it's a Category 3 you get this much…that doesn't really apply. The other thing it said is that you can't look at historic storm as an indication of how deep the water will get from a future storm. Back in 2002 when we did this feasibility study, we modeled, we anticipated, we predicted how deep flooding would be, how wide-spread that flooding would be, based on 11 historic storms. The 2002 Feasibility Report recommended a 1% plan, as the colonel said that in any given year there is a 1% chance that those designs will be exceeded, which is pretty low, but the levee elevations were only from nine feet to 15 feet. The highest structure in that project was 15-feet high, based on the way we used to do the modeling. After we did the IPET Report, the Corps revised the way they were going to design the projects in the future and we published our design guidelines in October of 2007 and boom, in 2007 we also get a WRDA Bill that authorized the Morganza to the Gulf project based on the old report, based on the 2002 report, 11 historic storms with elevation from nine to 15 feet and at the time we projected the cost of that project to be $886 million dollars, but there were no construction fund appropriated. I know you all were frustrated that we were authorized in '07 and we haven't built anything, but we don't have the kind of money we need to go to construction; we still don't have it. It wasn't given to us in '07, '08 or '09 or '10, so I know you are frustrated that we've done another study, but the fact of the matter is we can't go build it the way it is and it doesn't appear that Congress is going to come through with those construction funds, but we actually think it was a pro-active thing to move forward and do another post-authorization change report to bring this project up to the standards it needs to be and try to get it reauthorized.


Impact of HSDRRS Guidelines

- New Storm Surge Modeling
- Relative Sea Level Rise (RSLR): Increases area and depth of flooding
- Structural Superiority: Increases design elevations
- Higher Factors of Safety: Increases levee width / footprint

So, we talked about the changes in the guidelines; that fancy acrynoym at the top, it's the Hurricane Storm Damage Risk Reduction System, the HSDRRS Guidelines. The biggest change for you all down here and for every coastal project in Louisiana, was the new way we did the storm surge modeling. We used to look at 11 historic storms but they said that wasn't good enough, so now we look at those 11 historic storms, inclded in there is Katrina, Rita, Gustav, Ike, but we also look at the theoretical chance of what might happen. It's a suite of 152 storms with all different wind speeds, all different tracts and all different central pressures because we know the depth of the surge is not solely dependent on wind speed. It's all these things go together and there is theis big, fancy statistical thing that happens as we come out with a new way of designing the levees. Some other things that the HSDRRS Guidelines did, they had us consider more thoughtfully the relative sea level rise. We looked at what happens if we get the same level we've had historically, what if we get a little bit or a lot more; three levels of sea level rise because we realize that just looking back at 11 historic storms isn't going to help us 50 years into the future. We also looked at a things called Structural Superiority, that increases the height of your structures. The theory is if you have a levee, you can always add more dirt, but if you have concrete it's pretty hard to add something to the top, espeically if that concrete is a gate that opens and closes. We also increased our factors of safety and those moved to increase the width of the levee and the elevation of the levee.

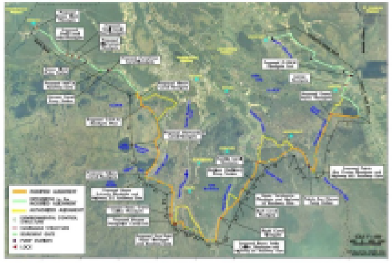

Comparison of Similar Levee Cross-Sections

Post-Katrina 100-year Cross-Section superimposed on Authorized Cross Section

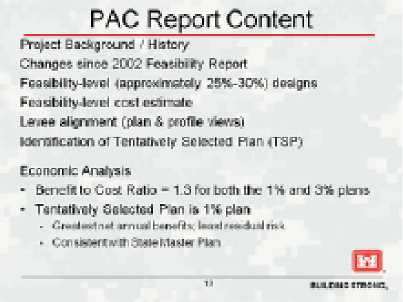
Levee Cross-Section – changes due to Katrina/Rita
--> 50% increase in height
--> 350% increase in base width

So here wer have this cross-section, and I know there is board over to the side you can see. The red is Breach G, which runs south of Lake Boudreaux between Dulac and Lake Cocodrie, that's approximately what it looked under the 2002 Feasability Report and then the blue shows more what we are proposing as a result of our new design critera. We used to have elevations from nine feet to 15 feet, but our new levee elevations now start at 17 feet and they go all the way up to as high as 33. It's not the same project and should say we do look at optimizing these things. We can get out 100-year level of risk reduction by going high and steep or by going a little lower and more gradual to knock down the waves. We run these modesl several different ways and we use the one that uses the least amoung of materials, at least at this point, that's how we refined it.

PAC Report Alignment



So here is the alignment. Let me show you where we started and I" going to step back and forth. Back in 2002 our levee alignment started over here, right here tied and into the Golden Meadow Levee and ended up here at Minors canal. The way we used to model storms is that we knew that 9-to-15 foot levees from here to here was going to give you the 1% plan for risk reduction. That was our 2002 report and while we were waiting on authorization of the project, we continued to refine our designs. You will see some of the yellow marks here, those are the changes that we made form 2002 up until about 2007, 2009, all the way up until just recently, where we looked at ways to reduce the environmental impact. For example, over here, we used to come all the way here straight up and that created a big funnel so we looked at cutting that off. So what you see in yellow are some of the original project alignments that we refined in the orange. Now, because of the new model that we use, we are getting deeper flooding and it's much more wide spread so we are extending the levee alignment all the way up here across the Larose/Golden Meadow Levee and following that levee and then coming up here with a whole new reach from Lockport to Larose. That's about 21 miles that has been added to the eastern side of the alignment. On the western side, our old modeling showed now water coming over the Bayou Black ridge. Our new modeling shows that sure enough , it's deeper and will get over this ridge. So in order to protect the same project area, we also had to extend the alignment all the way out to Gibson and that added 15 more miles. So we started at 72 miles with the yellow in the 2002 report then we actually got it down to about 62 miles when we refined the designs, then we added 15 here, 21 there and now we are at 98 miles. If we don't add those pieces to it, we don't preserve the integrity of the 1% system.



PAC Report Content

Project Background / History

Changes since 2002 Feasibility Report

Feasibility-level (approximately 25%-30%) designs

Feasibility-level cost estimate

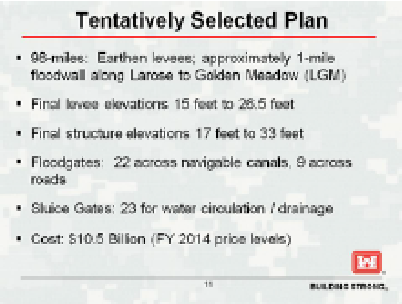
Levee alignment (plan & profile views)

Identification of Tentatively Selected Plan (TSP)

Economic Analysis

- Benefit to Cost Ratio = 1.3 for both the 1% and 3% plans
- Tentatively Selected Plan is 1% plan
  - Greatest net annual benefits; least residual risk
  - Consistent with State Master Plan

So we have this new PAC Report out and you may ask what's in it. It has a much more detailed history than you are hearing from me today. It's got very specific changes that has come about since 2002; it's got every single one called out. It has new designs as there are about 25-30% level of design for every structure and reach of levee. There is a cost estimate based on the quantity take offs of those designs. For those of you who really want to know if this is going to go across my property, around my property, thru my property, it has a plan and profiled used of all the levee and then at the end we identify what we have selected as the tenant of plan. This report, we looked at two plans; we looked at a 3% Plan and a 1% Plan. The reason for that is if we use some of the old modeling, the still waters from the old modeling, and then apply the new HSDRRS guidelines, we've got something that would be considered a 3% Plan. I know this is kind of crazy, but that is how we got to the 3% and then we have the whole new thing, just like it was done in New Orleans with all the new hurricane damage and risk reduction guidelines incorporated and that is your 1% Plan. We looked at both of those plans and both of them have a positive b/c ratio. People were pretty shocked to hear that we still had a positive b/c ratio, but it goes back to that storm surge modeling, the same thing that makes the levees higher and more expensive, increases the damages that the surge would cause. Our b/c ratio for both of those plans is very close to 1.3 and we have tentatively selected the 1% Plan because it has the highest amount of benefits and most importantly as the colonel was talking about, the least residual risk. You build the 1% Plan, there's fewer things that can occur at higher events. You build that 3% Plan, you are going to get more damages. Also, our 1% Plan is consistent with our state master plan that was published last year by the CPRA.



Tentatively Selected Plan

- 98-miles: Earthen levees; approximately 1-mile floodwall along Larose to Golden Meadow (LGM)
- Final levee elevations 15 feet to 26.5 feet
- Final structure elevations 17 feet to 33 feet
- Floodgates: 22 across navigable canals, 9 across roads
- Sluice Gates: 23 for water circulation / drainage
- Cost: $10.5 Billion (FY 2014 price levels)

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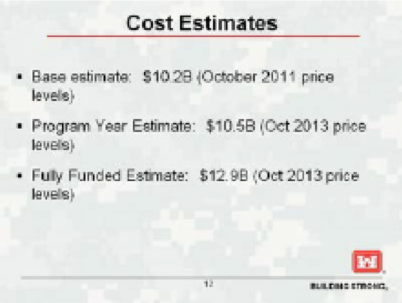
Our tentatively selected plan is 98 miles and all of it earthen levee, which if you are familiar with New Orleans, most of those levees along the Mississippi River are earthen levees, just dirt. There is a one-mile floodwall that is in the Golden Meadow to Larose project on the eastern side. Our levee elevations range 15 feet to 25.6 feet. Our structural elevations range from 17 to 33 feet and when I say final, we propose to have this project in place, funding and authorization going as best they can, by the year 2035. Then we need to maintain it for 50 years in the future. So when I say future levee elevations, I'm talking the year 2085 when our grandkids are out doing what they wanted to, that's when we will have those final elevations. There are 22 floodgates across navigable bayous, nine across roads and we have 23 sluice gates built into the project. A sluice gate is an opening in the levee alignment that will let water cross back-and-forth and obviously close if a storm event occurs. The cost of the 1% Plan in the PAC report is $10.5 billion, which is an extraordinary amount of money. It's a 98 mile system for 10 billion dollars. It is not that far off the Greater New Orleans system, which almost 14 billion dollars for 130 miles or so over an existing levee. It's a whole lot of money, but it's not out of line in what you would see as a result of similar design criteria.



Cost Estimates

- Base estimate: $10.2B (October 2011 price levels)
- Program Year Estimate: $10.5B (Oct 2013 price levels)
- Fully Funded Estimate: $12.9B (Oct 2013 price levels)

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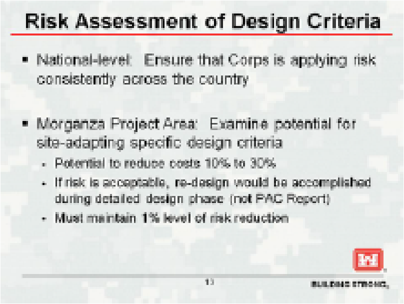
So when this PAC Report came out it confused a lot of people because we have a couple of different costs in there. The first costs we have talks about a $10.2 billion dollar cost. When we prepared these estimates they were done in October of 2011 price levels, we call it the fiscal year 2012 costs, but that number if only used in calculating the b/c radio. When we get to the final report we are going to clean this up so it reads a little less confusing. We are not going to report that $10.2 anymore because it's an old number already. That assumes that basically the whole project is built in that year, fiscal year 12. Then, we have to look at when do we ask for this money? The soonest we can ask at this point is the 2014 budget because 2013 is already underway. So, we inflated out Oct. 2013, which would be the fiscal 2014 price level, so we said 10.5 was what it was going to cost then; if we built the whole project at 2014, it cost 10.5 billion – this is the number that goes into the budget request to Congress. That's the one that you when you read $886 million back in the 2007 authorization, the authorization we would expect in 2014 would be $10.5. There is another number in there. We are bound by our regulations to report what is called a Fully Funded Cost Estimate. Instead of assuming that the whole project is built in a year, which is not realistic, it looks at the mid-point of each feature's construction. We are going to have this in place by 2035, but with subsidence and sea level rise, we need to keep adding a lit bit to the levee elevation to keep it above the level it needs to be all the way out to 2085. So, there are some features that weigh out in the 2070s and the Fully Funded Estimate escalates the costs all the way out to the mid-point of each feature's construction. Sometimes, this is the number that local sponsors would use if they are looking for bonds. That's just another number for decision makers; 10.5 would go in the Congressional budget.


Risk Assessment of Design Criteria

- National-level: Ensure that Corps is applying risk consistently across the country
- Morganza Project Area: Examine potential for site-adapting specific design criteria
  - Potential to reduce costs 10% to 30%
  - If risk is acceptable, re-design would be accomplished during detailed design phase (not PAC Report)
  - Must maintain 1% level of risk reduction

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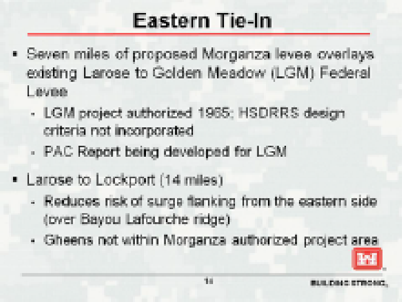
We recognize that 10.5 is a lot of money. As the colonel said, we recognize that design standards that were published for Gulf Coast, particularly for New Orleans, may not all apply here. They may not apply where Hurricane Sandy struck in the Northeast so the Corps is undertaking two different risk assessments. One is a national level assessment. If we use our HSDRRS guidelines in the Gulf, is that appropriate for the North Atlantic? If not, what is? The Corps has to make sure we are applying standards consistently across the country. That is one thing that is going on. The second thing is another assessment of just the Morganza project area; the storage that we have in Lake Boudreaux, the storage that we have over on the eastern side Pointe Aux Chenes, Ducks Unlimited Levee, maybe we can use slightly different criteria specially adapted for our project area. We think there is a potential there to reduce costs if the risks associated with those changes is acceptable, then we will redesign the project as we move forward. Once we get this PAC Report finalized and the chiefs writes his new report, we go to this Pre-Construction Engineering & Design and we continue to refine the designs and that is where we would incorporate the new design criteria. It's important to remember, we have this benefit-cost ratio of 1.3 to 1, but if we start toying too much with this criteria, say we decide you can take more overtopping, more water can come over the levee, well your levee elevation comes down and if more water comes over you are going to get more flooding, so it's not really straight forward. We need to maintain that 1% level of risk reduction. We can't lose any of our benefits when we reduce the levee elevations or otherwise site adapt the criteria.


Eastern Tie-In

- Seven miles of proposed Morganza levee overlays existing Larose to Golden Meadow (LGM) Federal Levee
  - LGM project authorized 1965; HSDRRS design criteria not incorporated
  - PAC Report being developed for LGM
- Larose to Lockport (14 miles)
  - Reduces risk of surge flanking from the eastern side (over Bayou Lafourche ridge)
  - Gheens not within Morganza authorized project area

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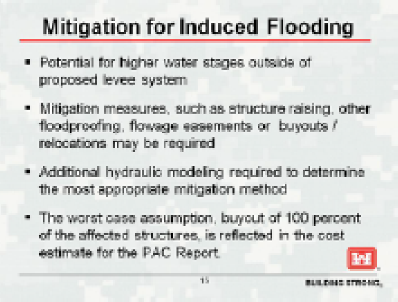
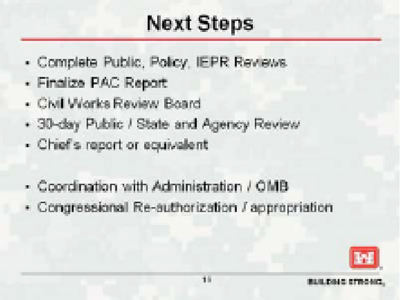
We talked a little bit about the eastern side where we tie in. We overlaid the Larose to Golden Meadow project by about seven miles. The Larose to Golden Meadow Project was authorized back in '65 and it doesn't have the HSDRRS criteria incorporated; either the Golden Meadow to Larose team is doing a post-authorization change on their project as well, but in case it's not in place by the time Morganza goes, we need to make sure that we protect the integrity of the 1% system so we have to build their levee. I mean it's all our levee…the other part on the eastern side is the Larose to Lockport. I talked about this already, but just as on the western side, we didn't think the water would come across the Bayou Black ridge, on the eastern side we didn't think the water could come across the north over the Bayou Lafourche Bridge. Our new modeling shows that h it wills o we extended that project as far we need to keep the water out of the Morganza project area. It doesn't extend to Gheens; Gheens is sitting on some high grounds. The modeling that we have for Morganza's project area, and our project area is shown on the very first slide, does not contain Gheens. We don't need a levee around Gheens to keep the water out of the Morganza project area.



Mitigation for Induced Flooding

- Potential for higher water stages outside of proposed levee system
- Mitigation measures, such as structure raising, other floodproofing, flowage easements or buyouts / relocations may be required
- Additional hydraulic modeling required to determine the most appropriate mitigation method
- The worst case assumption, buyout of 100 percent of the affected structures, is reflected in the cost estimate for the PAC Report

We know that there is some potential for higher water stages outside of the levee. Everyone says if you put the levee in the water has to go somewhere, it's going to get a little higher against the levee than it would if there was no levee. IT that's the case, then we will have to propose some mitigation measures as part of our report. The mitigation measures include raising the structures. Other flood proofing or flow easements or buyouts. Right now, we don't have the hydraulic modeling that tells us this structure is going to get this much additional flooding or this structure is going to get this much. There are detailed types of modeling but we haven't gone through the expense or the time to do that yet. We need to tell you that it's a very real possibility that if we get down the line and do our modeling, we are going to select one of those measures that is most appropriate for the structures that are lined outside of the levee. In this report, we assume the worst case. The most expensive thing we can do would be to buy out every structure that is not within the levee alignment. There's a very low possibility that that would every happen, but we need to disclose it as part of our National Environmental Policy Act, that there is potential for that and we need to let you know that it exists.

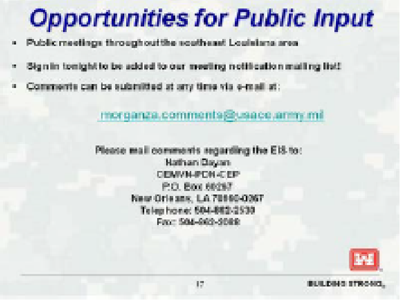


Next Steps

- Complete Public, Policy, IEPR Reviews
- Finalize PAC Report
- Civil Works Review Board
- 30-day Public / State and Agency Review
- Chief's report or equivalent

- Coordination with Administration / OMB
- Congressional Re-authorization / appropriation

The next steps; right now we are doing this public review and meeting and at the same time we have our policy folks up at headquarters and in our division completing policy review and they are going to get us their comments on Monday. We also have an external peer review team, this is another thing that come out of the WRDA 2007, the Louisiana Water Resources Council is taking a very detailed technical look at the report. Their comments come in on Monday and we incorporate all those and see if we have the right plan and report and we go forward and finalize the PAC Report. The colonel said he goes up to Washington D.C. to Civil Works Review Board to present his case. If all goes well there, the next step is to sign the chief's report, then you get to see it again. You have the draft report now and any changes we make we will do another round of public review and then we will get the chief's report. Once that chief's report is signed, it goes out the Corp's hands. It's up to the point where we coordinate with the Administration and move toward Congressional appropriation and authorization. The Corps's buck is going to stop right after the chief's report, although we are still very involved in the coordination.



Opportunities for Public Input

- Public meetings throughout the southeast Louisiana area
- Sign in tonight to be added to our meeting notification mailing list!
- Comments can be submitted at any time via e-mail at:

morganza.comments@usace.army.mil

Please mail comments regarding the EIS to:
Nathan Dayan
CEMVN-PDN-CEP
P.O. Box 60267
New Orleans, LA 70160-0267
Telephone: 504-862-2530
Fax: 504-862-2088

Ken Holder: This gives you an idea of where you can send your information if you want to fill out one of the cards and you don't want to talk in front of a group. The address is here.

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18

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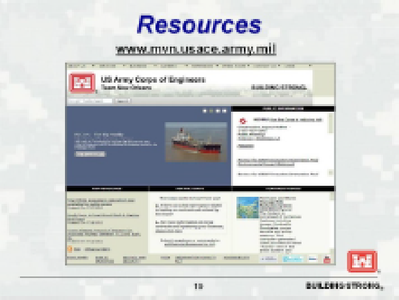

Resources

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19

BUILDING STRONG®

SPEA1

There's some other ways to keep up with what we are doing. Y ictures and other things on social media. With that, we are going to open this up for quest have to do is raise your hand. We will start first with some of our non-governmental organizations, the Morganza Action Coalition is first.

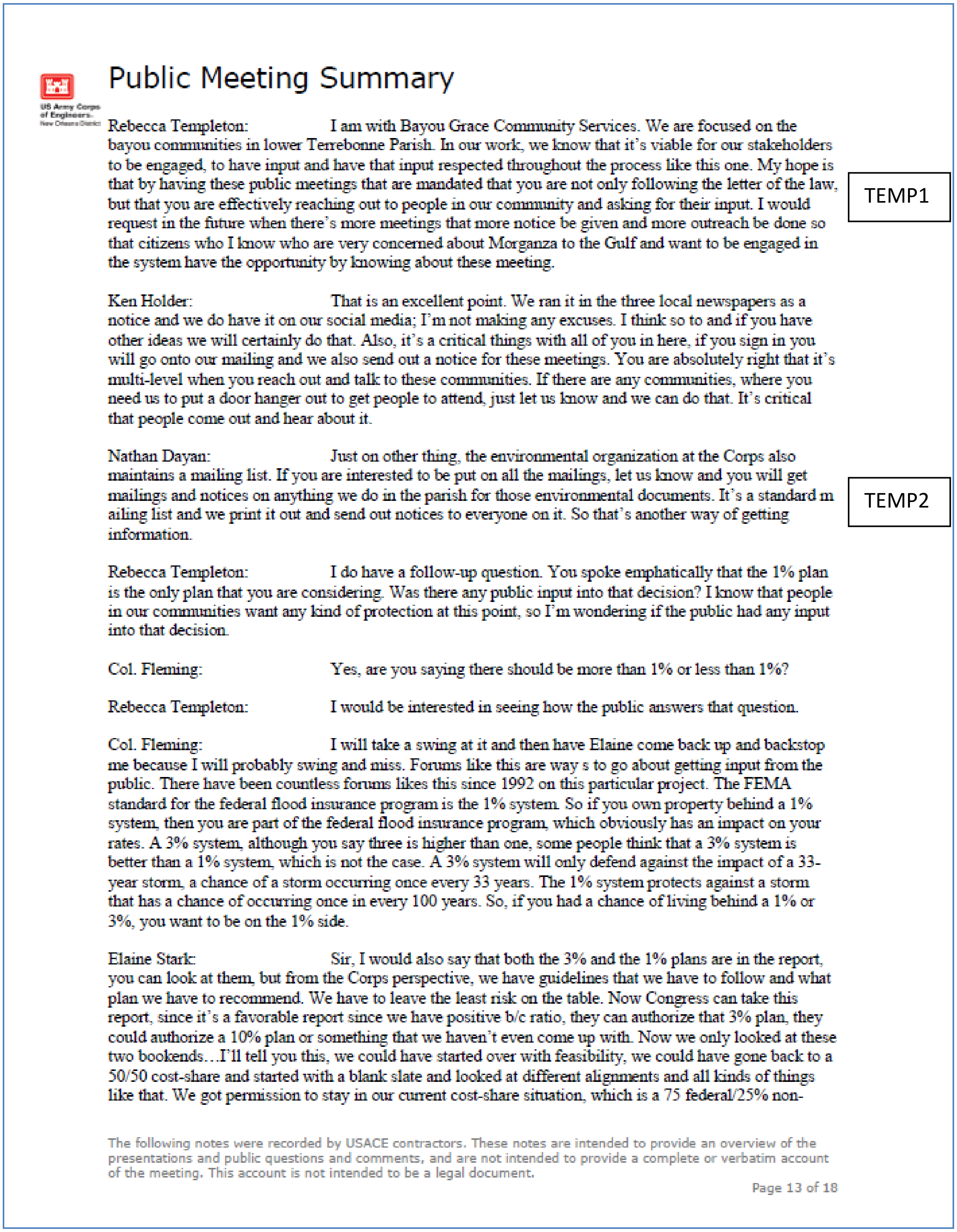
Female Speaker: Thank you so much colonel for being here and Elaine for being here. As you know I am a [Inaudible], a citizen of Terrebonne Parish by choice and an advocate of this community and what it means to this nation and to me personally. I was curious and one of the things I would like to point out, the list of things that you are talking about in terms of risk reduction, as far as I can tell we are doing every single one of those, including raising houses, doing mitigation and building wetlands, as part of our state plan. I do think we understand risks. One of the things I am despondent about, very frankly, is the idea that you have to get the 10.5 billion dollars authorization from the beginning. That number is staggering to me that I can't even envision how long it would take us to get to that point, much less to get that included in an authorization immediately. I was also looking at the point that when you submit the chief's report and once it's signed, I guess we step in. I would be curious…you know we are very stubborn…we were told by the general, by department administrations that we would never build a levee system and that was in a couple of meetings and so we have been fighting this battle and we don't give up and we just keep coming back. I would be interested in any comments that you can give that would give us some guidance about how to begin robbing as we are well aware that getting authorization doesn't give us money. What is our role at that point?

Col. Fleming: Once the chief of engineer's signs the chief's report and it gets presented to Congress, if you so choose, just like any other issue that you like to advocate for ,you can call your congressman or senator, go visit them, and they would probably be interested in hearing your concerns or support for any particular project. I think that's probably the best way of going about doing it, that is close coordination, not only with their local staff here in the state, but also their staff in Washington.

Female Speaker: [Inaudible]

Col. Fleming: Yes, that's a little bit tougher. I'm pretty sure that the folks who are familiar going back-and-forth to Washington, I know Reggie and you have made plenty of trips, there are folks who have made phone calls to OMB and just kind of cold called them by looking up their phone number on the website and said I want to come talk to you. They are federal employees just like the Corps of Engineers folks are federal employees. The one difference is that they don't have a local office here in Louisiana. That's not unheard of, that on your trip to Washington when you go see your congressman or senator, is you make a stop at Corps of Engineer Headquarters and you make a stop at OMB.

Ken Holder: Of course, the Congressional Delegation needs to get you that appointment obviously. We now have a representative from Bayou Grace.



US Army Corps of Engineers
New Orleans District

Public Meeting Summary

Rebecca Templeton: I am with Bayou Grace Community Services. We are focused on the bayou communities in lower Terrebonne Parish. In our work, we know that it's viable for our stakeholders to be engaged, to have input and have that input respected throughout the process like this one. My hope is that by having these public meetings that are mandated that you are not only following the letter of the law, but that you are effectively reaching out to people in our community and asking for their input. I would request in the future when there's more meetings that more notice be given and more outreach be done so that citizens who I know who are very concerned about Morganza to the Gulf and want to be engaged in the system have the opportunity by knowing about these meeting.

Ken Holder: That is an excellent point. We ran it in the three local newspapers as a notice and we do have it on our social media; I'm not making any excuses. I think so to and if you have other ideas we will certainly do that. Also, it's a critical things with all of you in here, if you sign in you will go onto our mailing and we also send out a notice for these meetings. You are absolutely right that it's multi-level when you reach out and talk to these communities. If there are any communities, where you need us to put a door hanger out to get people to attend, just let us know and we can do that. It's critical that people come out and hear about it.

Nathan Dayan: Just on other thing, the environmental organization at the Corps also maintains a mailing list. If you are interested to be put on all the mailings, let us know and you will get mailings and notices on anything we do in the parish for those environmental documents. It's a standard mailing list and we print it out and send out notices to everyone on it. So that's another way of getting information.

Rebecca Templeton: I do have a follow-up question. You spoke emphatically that the 1% plan is the only plan that you are considering. Was there any public input into that decision? I know that people in our communities want any kind of protection at this point, so I'm wondering if the public had any input into that decision.

Col. Fleming: Yes, are you saying there should be more than 1% or less than 1%?

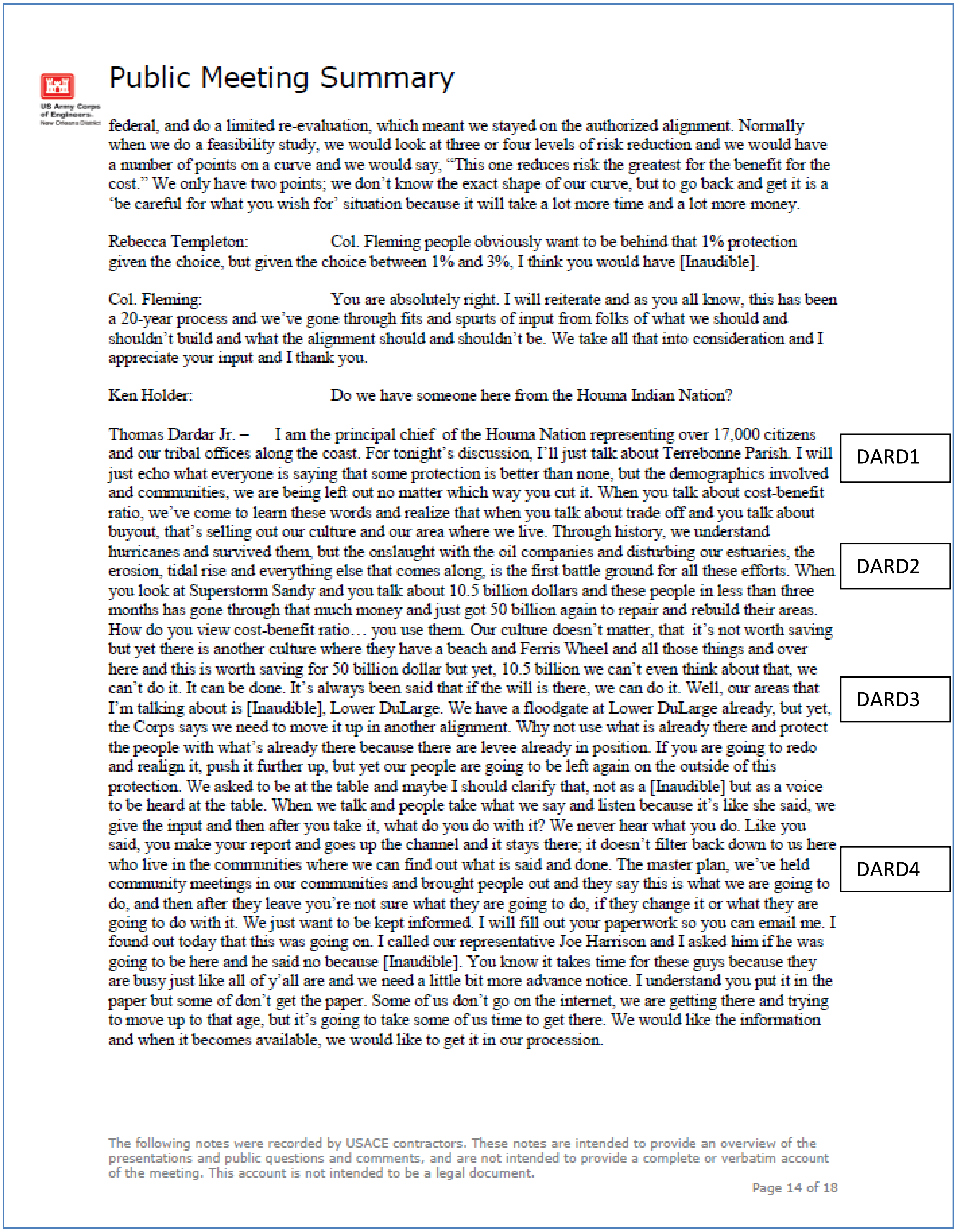
Rebecca Templeton: I would be interested in seeing how the public answers that question.

Col. Fleming: I will take a swing at it and then have Elaine come back up and backstop me because I will probably swing and miss. Forums like this are way s to go about getting input from the public. There have been countless forums likes this since 1992 on this particular project. The FEMA standard for the federal flood insurance program is the 1% system. So if you own property behind a 1% system, then you are part of the federal flood insurance program, which obviously has an impact on your rates. A 3% system, although you say three is higher than one, some people think that a 3% system is better than a 1% system, which is not the case. A 3% system will only defend against the impact of a 33-year storm, a chance of a storm occurring once every 33 years. The 1% system protects against a storm that has a chance of occurring once in every 100 years. So, if you had a chance of living behind a 1% or 3%, you want to be on the 1% side.

Elaine Stark: Sir, I would also say that both the 3% and the 1% plans are in the report, you can look at them, but from the Corps perspective, we have guidelines that we have to follow and what plan we have to recommend. We have to leave the least risk on the table. Now Congress can take this report, since it's a favorable report since we have positive b/c ratio, they can authorize that 3% plan, they could authorize a 10% plan or something that we haven't even come up with. Now we only looked at these two bookends…I'll tell you this, we could have started over with feasibility, we could have gone back to a 50/50 cost-share and started with a blank slate and looked at different alignments and all kinds of things like that. We got permission to stay in our current cost-share situation, which is a 75 federal/25% non-

TEMP1

TEMP2



Public Meeting Summary

federal, and do a limited re-evaluation, which meant we stayed on the authorized alignment. Normally when we do a feasibility study, we would look at three or four levels of risk reduction and we would have a number of points on a curve and we would say, "This one reduces risk the greatest for the benefit for the cost." We only have two points; we don't know the exact shape of our curve, but to go back and get it is a 'be careful for what you wish for' situation because it will take a lot more time and a lot more money.

Rebecca Templeton: Col. Fleming people obviously want to be behind that 1% protection given the choice, but given the choice between 1% and 3%, I think you would have [Inaudible].

Col. Fleming: You are absolutely right. I will reiterate and as you all know, this has been a 20-year process and we've gone through fits and spurts of input from folks of what we should and shouldn't build and what the alignment should and shouldn't be. We take all that into consideration and I appreciate your input and I thank you.

Ken Holder: Do we have someone here from the Houma Indian Nation?

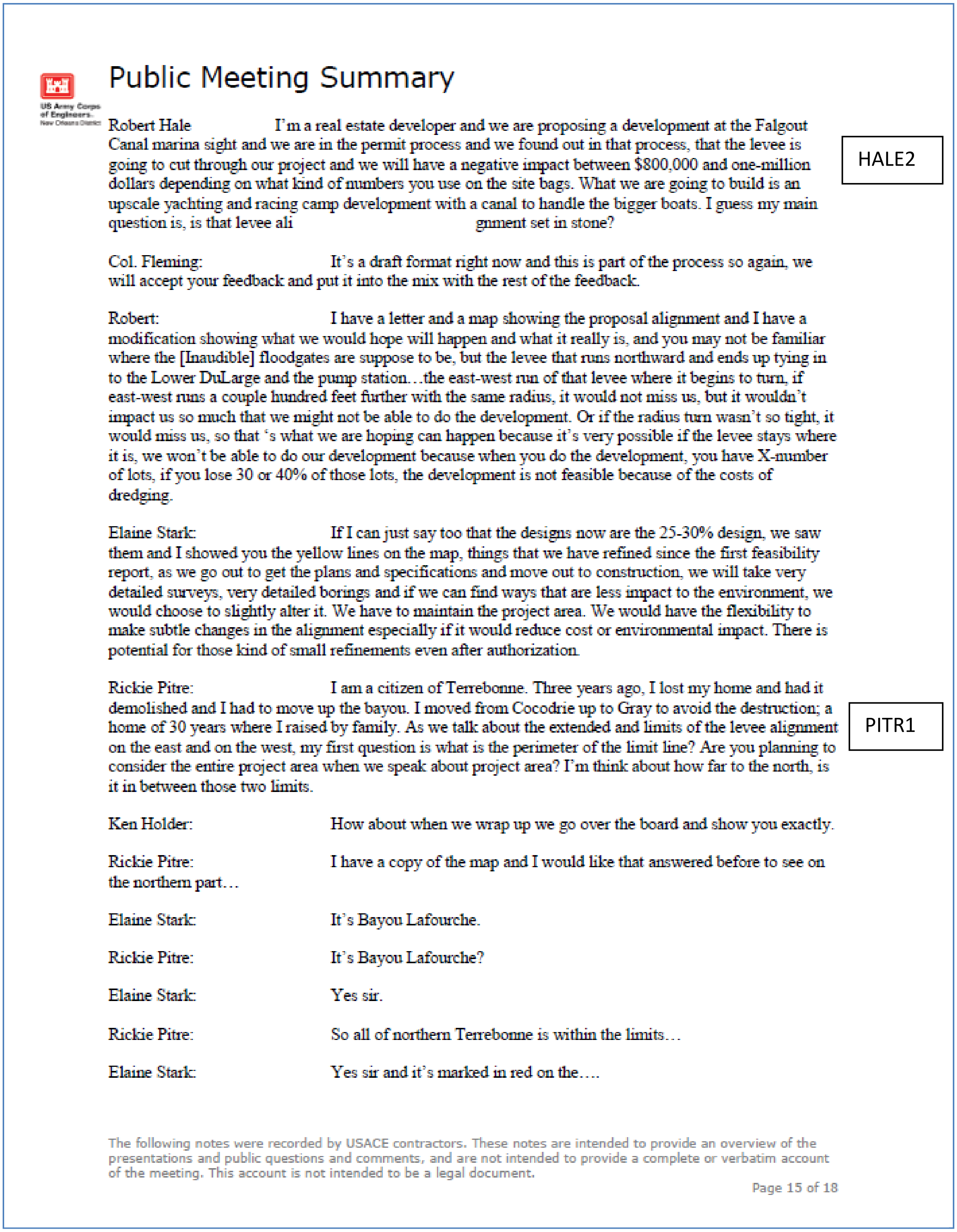
Thomas Dardar Jr. – I am the principal chief of the Houma Nation representing over 17,000 citizens and our tribal offices along the coast. For tonight's discussion, I'll just talk about Terrebonne Parish. I will just echo what everyone is saying that some protection is better than none, but the demographics involved and communities, we are being left out no matter which way you cut it. When you talk about cost-benefit ratio, we've come to learn these words and realize that when you talk about trade off and you talk about buyout, that's selling out our culture and our area where we live. Through history, we understand hurricanes and survived them, but the onslaught with the oil companies and disturbing our estuaries, the erosion, tidal rise and everything else that comes along, is the first battle ground for all these efforts. When you look at Superstorm Sandy and you talk about 10.5 billion dollars and these people in less than three months has gone through that much money and just got 50 billion again to repair and rebuild their areas. How do you view cost-benefit ratio… you use them. Our culture doesn't matter, that it's not worth saving but yet there is another culture where they have a beach and Ferris Wheel and all those things and over here and this is worth saving for 50 billion dollar but yet, 10.5 billion we can't even think about that, we can't do it. It can be done. It's always been said that if the will is there, we can do it. Well, our areas that I'm talking about is [Inaudible], Lower DuLarge. We have a floodgate at Lower DuLarge already, but yet, the Corps says we need to move it up in another alignment. Why not use what is already there and protect the people with what's already there because there are levee already in position. If you are going to redo and realign it, push it further up, but yet our people are going to be left again on the outside of this protection. We asked to be at the table and maybe I should clarify that, not as a [Inaudible] but as a voice to be heard at the table. When we talk and people take what we say and listen because it's like she said, we give the input and then after you take it, what do you do with it? We never hear what you do. Like you said, you make your report and goes up the channel and it stays there; it doesn't filter back down to us here who live in the communities where we can find out what is said and done. The master plan, we've held community meetings in our communities and brought people out and they say this is what we are going to do, and then after they leave you're not sure what they are going to do, if they change it or what they are going to do with it. We just want to be kept informed. I will fill out your paperwork so you can email me. I found out today that this was going on. I called our representative Joe Harrison and I asked him if he was going to be here and he said no because [Inaudible]. You know it takes time for these guys because they are busy just like all of y'all are and we need a little bit more advance notice. I understand you put it in the paper but some of don't get the paper. Some of us don't go on the internet, we are getting there and trying to move up to that age, but it's going to take some of us time to get there. We would like the information and when it becomes available, we would like to get it in our procession.

DARD1

DARD2

DARD3

DARD4



Public Meeting Summary

Robert Hale I'm a real estate developer and we are proposing a development at the Falgout Canal marina sight and we are in the permit process and we found out in that process, that the levee is going to cut through our project and we will have a negative impact between $800,000 and one-million dollars depending on what kind of numbers you use on the site bags. What we are going to build is an upscale yachting and racing camp development with a canal to handle the bigger boats. I guess my main question is, is that levee alignment set in stone?

HALE2

Col. Fleming: It's a draft format right now and this is part of the process so again, we will accept your feedback and put it into the mix with the rest of the feedback.

Robert: I have a letter and a map showing the proposal alignment and I have a modification showing what we would hope will happen and what it really is, and you may not be familiar where the [Inaudible] floodgates are suppose to be, but the levee that runs northward and ends up tying in to the Lower DuLarge and the pump station…the east-west run of that levee where it begins to turn, if east-west runs a couple hundred feet further with the same radius, it would not miss us, but it wouldn't impact us so much that we might not be able to do the development. Or if the radius turn wasn't so tight, it would miss us, so that 's what we are hoping can happen because it's very possible if the levee stays where it is, we won't be able to do our development because when you do the development, you have X-number of lots, if you lose 30 or 40% of those lots, the development is not feasible because of the costs of dredging.

Elaine Stark: If I can just say too that the designs now are the 25-30% design, we saw them and I showed you the yellow lines on the map, things that we have refined since the first feasibility report, as we go out to get the plans and specifications and move out to construction, we will take very detailed surveys, very detailed borings and if we can find ways that are less impact to the environment, we would choose to slightly alter it. We have to maintain the project area. We would have the flexibility to make subtle changes in the alignment especially if it would reduce cost or environmental impact. There is potential for those kind of small refinements even after authorization.

Rickie Pitre: I am a citizen of Terrebonne. Three years ago, I lost my home and had it demolished and I had to move up the bayou. I moved from Cocodrie up to Gray to avoid the destruction; a home of 30 years where I raised by family. As we talk about the extended and limits of the levee alignment on the east and on the west, my first question is what is the perimeter of the limit line? Are you planning to consider the entire project area when we speak about project area? I'm think about how far to the north, is it in between those two limits.

PITR1

Ken Holder: How about when we wrap up we go over the board and show you exactly.

Rickie Pitre: I have a copy of the map and I would like that answered before to see on the northern part…

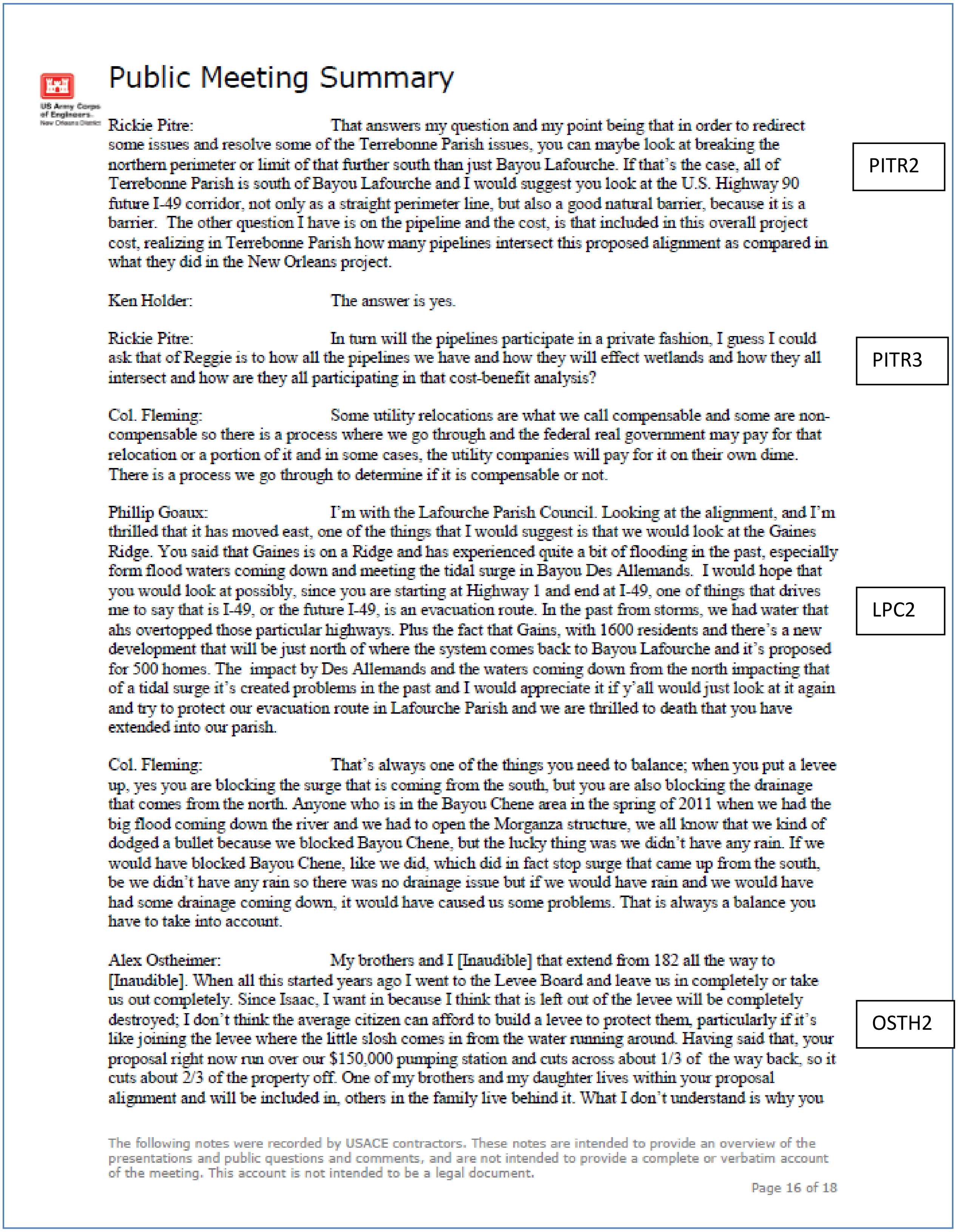
Elaine Stark: It's Bayou Lafourche.

Rickie Pitre: It's Bayou Lafourche?

Elaine Stark: Yes sir.

Rickie Pitre: So all of northern Terrebonne is within the limits…

Elaine Stark: Yes sir and it's marked in red on the….



Public Meeting Summary

Rickie Pitre: That answers my question and my point being that in order to redirect some issues and resolve some of the Terrebonne Parish issues, you can maybe look at breaking the northern perimeter or limit of that further south than just Bayou Lafourche. If that's the case, all of Terrebonne Parish is south of Bayou Lafourche and I would suggest you look at the U.S. Highway 90 future I-49 corridor, not only as a straight perimeter line, but also a good natural barrier, because it is a barrier. The other question I have is on the pipeline and the cost, is that included in this overall project cost, realizing in Terrebonne Parish how many pipelines intersect this proposed alignment as compared in what they did in the New Orleans project.

PITR2

Ken Holder: The answer is yes.

Rickie Pitre: In turn will the pipelines participate in a private fashion, I guess I could ask that of Reggie is to how all the pipelines we have and how they will effect wetlands and how they all intersect and how are they all participating in that cost-benefit analysis?

PITR3

Col. Fleming: Some utility relocations are what we call compensable and some are non-compensable so there is a process where we go through and the federal real government may pay for that relocation or a portion of it and in some cases, the utility companies will pay for it on their own dime. There is a process we go through to determine if it is compensable or not.

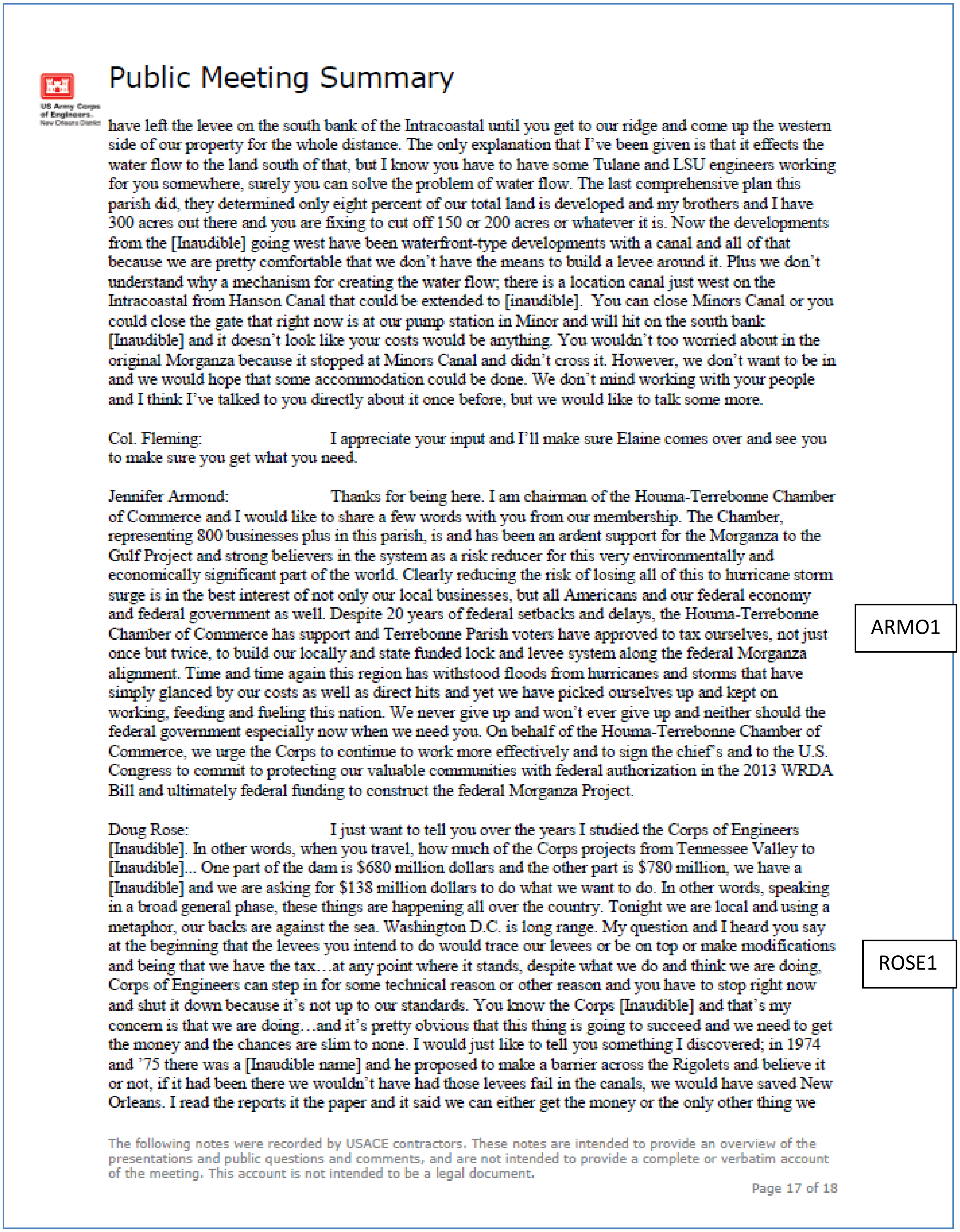
Phillip Goaux: I'm with the Lafourche Parish Council. Looking at the alignment, and I'm thrilled that it has moved east, one of the things that I would suggest is that we would look at the Gaines Ridge. You said that Gaines is on a Ridge and has experienced quite a bit of flooding in the past, especially form flood waters coming down and meeting the tidal surge in Bayou Des Allemands. I would hope that you would look at possibly, since you are starting at Highway 1 and end at I-49, one of things that drives me to say that is I-49, or the future I-49, is an evacuation route. In the past from storms, we had water that ahs overtopped those particular highways. Plus the fact that Gains, with 1600 residents and there's a new development that will be just north of where the system comes back to Bayou Lafourche and it's proposed for 500 homes. The impact by Des Allemands and the waters coming down from the north impacting that of a tidal surge it's created problems in the past and I would appreciate it if y'all would just look at it again and try to protect our evacuation route in Lafourche Parish and we are thrilled to death that you have extended into our parish.

LPC2

Col. Fleming: That's always one of the things you need to balance; when you put a levee up, yes you are blocking the surge that is coming from the south, but you are also blocking the drainage that comes from the north. Anyone who is in the Bayou Chene area in the spring of 2011 when we had the big flood coming down the river and we had to open the Morganza structure, we all know that we kind of dodged a bullet because we blocked Bayou Chene, but the lucky thing was we didn't have any rain. If we would have blocked Bayou Chene, like we did, which did in fact stop surge that came up from the south, be we didn't have any rain so there was no drainage issue but if we would have rain and we would have had some drainage coming down, it would have caused us some problems. That is always a balance you have to take into account.

Alex Ostheimer: My brothers and I [Inaudible] that extend from 182 all the way to [Inaudible]. When all this started years ago I went to the Levee Board and leave us in completely or take us out completely. Since Isaac, I want in because I think that is left out of the levee will be completely destroyed; I don't think the average citizen can afford to build a levee to protect them, particularly if it's like joining the levee where the little slosh comes in from the water running around. Having said that, your proposal right now run over our $150,000 pumping station and cuts across about 1/3 of the way back, so it cuts about 2/3 of the property off. One of my brothers and my daughter lives within your proposal alignment and will be included in, others in the family live behind it. What I don't understand is why you

OSTH2



have left the levee on the south bank of the Intracoastal until you get to our ridge and come up the western side of our property for the whole distance. The only explanation that I've been given is that it effects the water flow to the land south of that, but I know you have to have some Tulane and LSU engineers working for you somewhere, surely you can solve the problem of water flow. The last comprehensive plan this parish did, they determined only eight percent of our total land is developed and my brothers and I have 300 acres out there and you are fixing to cut off 150 or 200 acres or whatever it is. Now the developments from the [Inaudible] going west have been waterfront-type developments with a canal and all of that because we are pretty comfortable that we don't have the means to build a levee around it. Plus we don't understand why a mechanism for creating the water flow; there is a location canal just west on the Intracoastal from Hanson Canal that could be extended to [inaudible]. You can close Minors Canal or you could close the gate that right now is at our pump station in Minor and will hit on the south bank [Inaudible] and it doesn't look like your costs would be anything. You wouldn't too worried about in the original Morganza because it stopped at Minors Canal and didn't cross it. However, we don't want to be in and we would hope that some accommodation could be done. We don't mind working with your people and I think I've talked to you directly about it once before, but we would like to talk some more.

Col. Fleming: I appreciate your input and I'll make sure Elaine comes over and see you to make sure you get what you need.

Jennifer Armond: Thanks for being here. I am chairman of the Houma-Terrebonne Chamber of Commerce and I would like to share a few words with you from our membership. The Chamber, representing 800 businesses plus in this parish, is and has been an ardent support for the Morganza to the Gulf Project and strong believers in the system as a risk reducer for this very environmentally and economically significant part of the world. Clearly reducing the risk of losing all of this to hurricane storm surge is in the best interest of not only our local businesses, but all Americans and our federal economy and federal government as well. Despite 20 years of federal setbacks and delays, the Houma-Terrebonne Chamber of Commerce has support and Terrebonne Parish voters have approved to tax ourselves, not just once but twice, to build our locally and state funded lock and levee system along the federal Morganza alignment. Time and time again this region has withstood floods from hurricanes and storms that have simply glanced by our costs as well as direct hits and yet we have picked ourselves up and kept on working, feeding and fueling this nation. We never give up and won't ever give up and neither should the federal government especially now when we need you. On behalf of the Houma-Terrebonne Chamber of Commerce, we urge the Corps to continue to work more effectively and to sign the chief's and to the U.S. Congress to commit to protecting our valuable communities with federal authorization in the 2013 WRDA Bill and ultimately federal funding to construct the federal Morganza Project.

ARMO1

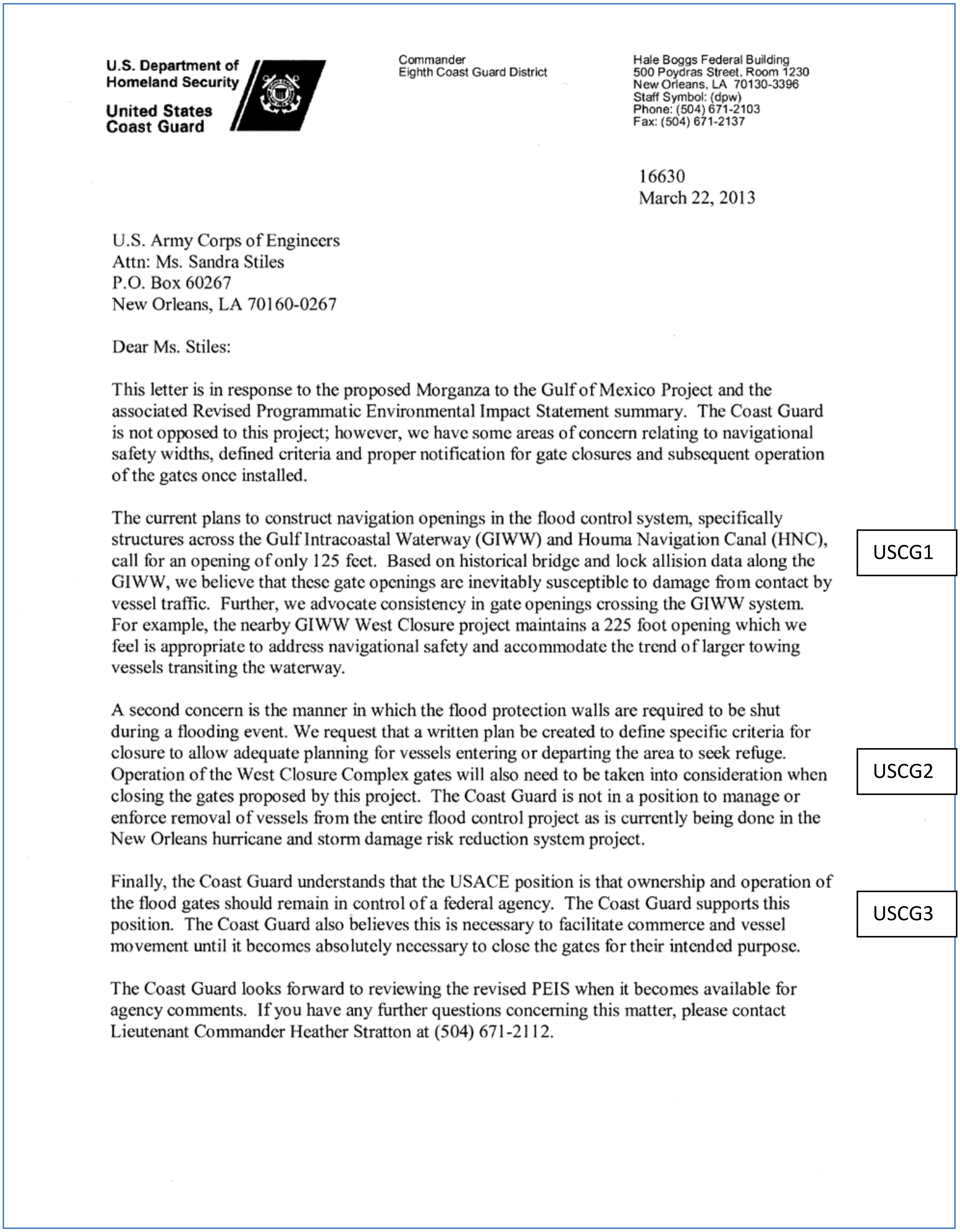
Doug Rose: I just want to tell you over the years I studied the Corps of Engineers [Inaudible]. In other words, when you travel, how much of the Corps projects from Tennessee Valley to [Inaudible]... One part of the dam is $680 million dollars and the other part is $780 million, we have a [Inaudible] and we are asking for $138 million dollars to do what we want to do. In other words, speaking in a broad general phase, these things are happening all over the country. Tonight we are local and using a metaphor, our backs are against the sea. Washington D.C. is long range. My question and I heard you say at the beginning that the levees you intend to do would trace our levees or be on top or make modifications and being that we have the tax…at any point where it stands, despite what we do and think we are doing, Corps of Engineers can step in for some technical reason or other reason and you have to stop right now and shut it down because it's not up to our standards. You know the Corps [Inaudible] and that's my concern is that we are doing…and it's pretty obvious that this thing is going to succeed and we need to get the money and the chances are slim to none. I would just like to tell you something I discovered; in 1974 and '75 there was a [Inaudible name] and he proposed to make a barrier across the Rigolets and believe it or not, if it had been there we wouldn't have had those levees fail in the canals, we would have saved New Orleans. I read the reports it the paper and it said we can either get the money or the only other thing we

ROSE1

could do is if there was a big storm, if we are washed out and everything is gone, where in the hell are we? When you give us the money it might not be too much. I'm going to live any of this, but I'm telling you it's a very close question to me and if there anything you can fix in your mind, one thing I know, I do know this you have to answer to Washington, D.C. When you wear that army uniform, they give you an order and you have to do it. At any rate, is there any way you can stop this or delay it or we can't do it, let's say for five years, and then in five years again we are back to another study. I think that is the perfect question.

Col. Fleming: It is and I am going to try to answer it and do my best. I can't stand here and tell you what someone is going to tell me five years from now or what they are going to tell the net colonel that comes thru. I can't tell you that; I would be lying if I stood here and told you, but this is what I can tell you. The Terrebonne Levee District is building a levee right now. They are building it along this alignment and they are building it to the Corps of Engineer standards and they are going to keep on building it and we are going to come on top of that and we are going to come and build our levee right on top of that. If things work out right, and we've worked with them very closely to tell them how they need they need to do it and how we can work together, not only are they going to continue to build that, but the money they are using that right now, may, maybe part of the cost-share of the federal project. So not only is it good that they are building it right now and I don't think we highlighted it enough early, it's a 10.5 billion dollar project that is cost-shared 65% federal, 35% local. So I'm not going to bring 10.5 billion, I'm going to bring 65% of that and between the state and Terrebonne Levee District, they are going to pay the 35% of that or roughly over three billion dollars. They may get credit for the work they are doing right now. Now as I said there will be a couple of things that will happen and Reggie knows all that needs to happen to make it work, but we need to make sure you get credit for the work you are doing right now as part of your cost-share for that larger federal project.

END OF MEETING



U.S. Department of
Homeland Security

United States
Coast Guard

Commander
Eighth Coast Guard District

Hale Boggs Federal Building
500 Poydras Street, Room 1230
New Orleans, LA 70130-3396
Staff Symbol: (dpw)
Phone: (504) 671-2103
Fax: (504) 671-2137

16630
March 22, 2013

U.S. Army Corps of Engineers
Attn: Ms. Sandra Stiles
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Ms. Stiles:

This letter is in response to the proposed Morganza to the Gulf of Mexico Project and the associated Revised Programmatic Environmental Impact Statement summary. The Coast Guard is not opposed to this project; however, we have some areas of concern relating to navigational safety widths, defined criteria and proper notification for gate closures and subsequent operation of the gates once installed.

The current plans to construct navigation openings in the flood control system, specifically structures across the Gulf Intracoastal Waterway (GIWW) and Houma Navigation Canal (HNC), call for an opening of only 125 feet. Based on historical bridge and lock allision data along the GIWW, we believe that these gate openings are inevitably susceptible to damage from contact by vessel traffic. Further, we advocate consistency in gate openings crossing the GIWW system. For example, the nearby GIWW West Closure project maintains a 225 foot opening which we feel is appropriate to address navigational safety and accommodate the trend of larger towing vessels transiting the waterway.

USCG1

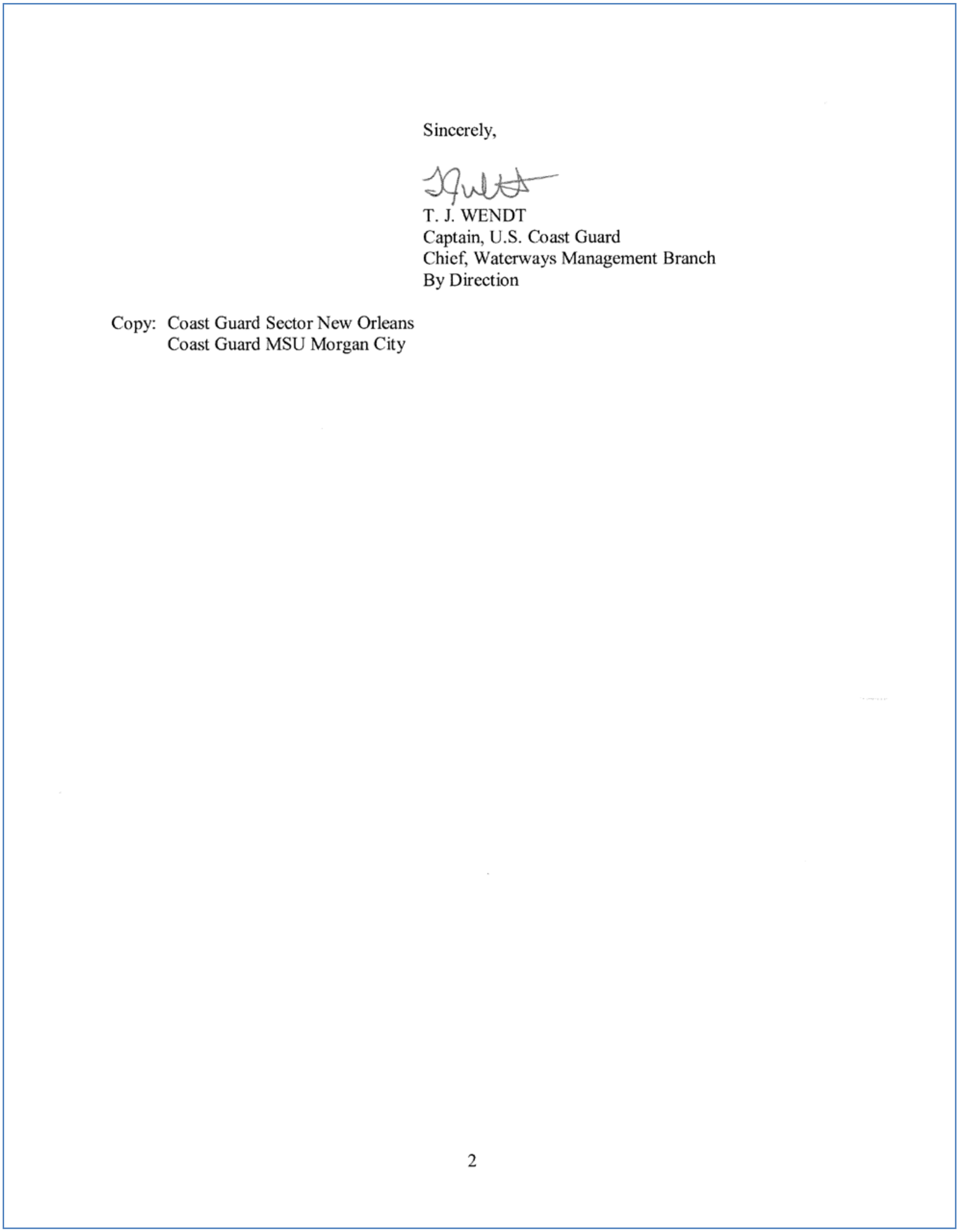
A second concern is the manner in which the flood protection walls are required to be shut during a flooding event. We request that a written plan be created to define specific criteria for closure to allow adequate planning for vessels entering or departing the area to seek refuge. Operation of the West Closure Complex gates will also need to be taken into consideration when closing the gates proposed by this project. The Coast Guard is not in a position to manage or enforce removal of vessels from the entire flood control project as is currently being done in the New Orleans hurricane and storm damage risk reduction system project.

USCG2

Finally, the Coast Guard understands that the USACE position is that ownership and operation of the flood gates should remain in control of a federal agency. The Coast Guard supports this position. The Coast Guard also believes this is necessary to facilitate commerce and vessel movement until it becomes absolutely necessary to close the gates for their intended purpose.

USCG3

The Coast Guard looks forward to reviewing the revised PEIS when it becomes available for agency comments. If you have any further questions concerning this matter, please contact Lieutenant Commander Heather Stratton at (504) 671-2112.



Sincerely,

T. J. WENDT
Captain, U.S. Coast Guard
Chief, Waterways Management Branch
By Direction

Copy: Coast Guard Sector New Orleans
Coast Guard MSU Morgan City

Appendix F

WETLAND VALUE ASSESSMENT

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

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

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-P

28 February 2012

MEMORANDUM FOR Director, National Ecosystem Restoration Planning Center of Expertise (ECO-PCX)

SUBJECT: Wetland Value Assessment Models – Coastal Marsh Module Version 1.0 – Approval for Use

1. The Coastal Marsh Community model is one of seven WVA community models that were developed by the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) Environmental Work Group. Based on information provided by the ECO-PCX, it is the understanding of the HQUSACE Model Certification Panel that this model will be used on the following projects over the next five years:

a. MRGO Ecosystem Restoration
b. Barataria Basin Barrier Shoreline
c. Lake Pontchatrain and Vicinity Hurricane Storm Damage Risk Reduction System (HSDRRS) Mitigation
d. West Bank and Vicinity HSDRRS Mitigation
e. HSDRRS IERS –total number unknown
f. Louisiana Coastal Area (LCA) 4 Davis Pond Modification
g. LCA4 Modification to Caernarvon
h. LCA4 Point Au Fer Island
i. LCA4 Caillou Lake Land Bridge
j. LCA Myrtle Grove
k. LCA White Ditch PED
l. LCA Mississippi River Hydrodynamic and Delta Management
m. LCA Caernarvon
n. Larose to Golden Meadow (LGM) Post-Authorization Change (PAC) Study
o. Larose to Golden Meadow Intracoastal Floodwall Reach 2b (LGM-022C).
p. Larose to Golden Meadow Intracoastal Floodwall Reach 2a (LGM-022B).
q. Larose to Golden Meadow C-North Highway 24 Relocation (LGM-001C).
r. Baptiste Collette Bayou Deepening study
s. Barataria Bay Waterway (CAP 204)
t. Buras Marina (CAP 206)
u. Calcasieu River and Pass (CAP 204)
v. Calcasieu Lock Replacement
w. Morganza to the Gulf PAC
x. Morganza to the Gulf Supplemental NEPA documents –total number unknown
y. Southwest Coastal
z. Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) – West Bay Closure
aa. Houma Navigation Canal Deepening
bb. West Shore Lake Pontchartrain Hurricane & Flood Risk Reduction
cc. LCA Terrebonne Basin Barrier Shoreline Restoration
dd. LCA Demonstration Projects Grand Isle and Vicinity Project
ee. CAP 103 Grand Isle Highway 1 Shoreline Stabilization
ff. Donalsonville to the Gulf
gg. NOV Plaquemines Parish
hh. NFL Plaquemines Parish

2. Version 1.0 of the Coastal Marsh Community model is approved for use for the above projects. This approval for use is based on the decision of the HQUSACE Model Certification Panel which considered the ECO-PCX assessment of the model. Adequate technical reviews have been accomplished and the model meets the certification criteria contained in EC 1105-2-412. As indicated by the ECO-PCX, there are a number of unresolved issues related to the form of suitability graphs for Variables 1, 2 and 3 and the aggregation methods used to combine the marsh habitat units and open water habitat units for each sub-model. To increase the understanding of the sensitivity of the model to the unresolved issues and the impact the model differences may have on decision-making, the ECO-PCX is to work with the project delivery teams to conduct sensitivity analyses for each application of the marsh models. A summary of the sensitivity analyses must be presented in the project documentation and Agency Technical Review teams must be charged with reviewing the adequacy and findings of the sensitivity analyses.

3. It is expected that compiliation of the findings of the multiple sensitivity analyses will lead to updates and improvements of the model. As such, version control is imperative. The PCX must ensure that project delivery teams are are utilizing the most appropriate version of the model for their analyses and that they are properly identifiying the version of the model being used.

APPLICABILITY: This approval for use expires 28 February 2017 and is limited to the above studies with the caveat that updated versions of the model be used if appropriate.

Harry E Kitch
HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
MISSISSIPPI VALLEY DIVISION, CORPS OF ENGINEERS
P.O. BOX 80
VICKSBURG, MISSISSIPPI 39181-0080

REPLY TO
ATTENTION OF:

CEMVD-PD-N 12 March 2012

MEMORAMDUM FOR CECW-PC (Wes Coleman)

SUBJECT: Wetland Value Assessment Models – Marsh Model, Recommendation for Single Use Approval on Multiple Projects

1. References

a. Engineering Circular 1105-2-412: Assuring Quality of Planning Models, dated 31 March 2011.

b. CEMVN Memorandum Subject: Wetland Value Assessment Models – Marsh Model, Summary of Model Review Results and Recommendation for Interim Approval, dated 6 February 2012.

2. The National Ecosystem Planning Center of Expertise (ECO-PCX) recommended approval of the Wetland Value Assessment (WVA) Coastal Marsh Community Models 1.0 for in Reference a. The Headquarters Model Certification Team discussed the Coastal Marsh Community model on 14 February 2012 and requested a list of projects that plan to use the model over the next 5 years. Below is a list of projects that plan to use the Coastal Marsh Model.

a. MRGO Ecosystem Restoration
b. Barataria Basin Barrier Shoreline
c. Lake Pontchatrain and Vicinity Hurricane Storm Damage Risk Reduction System (HSDRRS) Mitigation
d. West Bank and Vicinity HSDRRS Mitigation
e. HSDRRS IERS – multiple total number unknown
f. Louisiana Coastal Area (LCA)4 Davis Pond Modification
g. LCA4 Modification to Caernarvon
h. LCA4 Point Au Fer Island
i. LCA4 Caillou Lake Land Bridge
j. LCA Myrtle Grove
k. LCA White Ditch PED
l. LCA Mississippi River Hydrodynamic and Delta Management
m. LCA Caernarvon
n. Larose to Golden Meadow (LGM) Post-Authorization Change (PAC) Study and SEIS
o. Larose to Golden Meadow Intracoastal Floodwall Reach 2b (LGM-022C).
p. Larose to Golden Meadow Intracoastal Floodwall Reach 2a (LGM-022B).
q. Larose to Golden Meadow C-North Highway 24 Relocation (LGM-001C).
r. Baptiste Collette Bayou Deepening study (Conducted by local interests under WRDA 86, Section 203)

s. Barataria Bay Waterway (CAP 204)
t. Buras Marina (CAP 206)
u. Calcasieu River and Pass (CAP 204)
v. Calcasieu Lock Replacement
w. Morganza to the Gulf PAC
x. Morganza to the Gulf Supplemental NEPA documents – multiple total number unknown
y. Southwest Coastal
z. Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) – West Bay Closure
aa. Houma Navigation Canal Deepening
bb. West Shore Lake Pontchartrain Hurricane & Flood Risk Reduction
cc. LCA Terrebonne Basin Barrier Shoreline Restoration
dd. LCA Demonstration Projects Grand Isle and Vicinity Project
ee. CAP 103 Grand Isle Highway 1 Shoreline Stabilization
ff. Donalsonville to the Gulf
gg. NOV Plaquemines Parish
hh. NFL Plaquemines Parish

9. The ECO-PCX recommends a single use approval of the Wetland Value Assessment Coastal Marsh Community Model 1.0 on the projects listed above.

Jodi Creswell
Jodi K. Creswell
Operational Director, Ecosystem Restoration
Planning Center of Expertise

CF:
CECW-PC (Matusiak)
CECW-CP (Kitch, Hughes)
CECW-PB (Carlson)
CECW-MVD (Redican, Lucyshyn, Marlowe)
CEMVN-PD (Constance, Young)
CEMVD-PD-N (Wilbanks, Smith, Ruff, Chewning, Kleiss, Creswell, Vigh)
CEMVN-PD-P (Miller)
CEMVN-PDN (Exnicios)
CEMVN- PDN-CEP (Stiles, Klein, Dayan, Behrens)
CEMVN-PM-OR (Bosenberg)
CEERD-EE-E (Fischenich)

Methodology for Quantifying Environmental Benefits/Impacts

The study area was divided into subunits or polygons having similar wetland loss characteristics and loss rates (Figure 1).

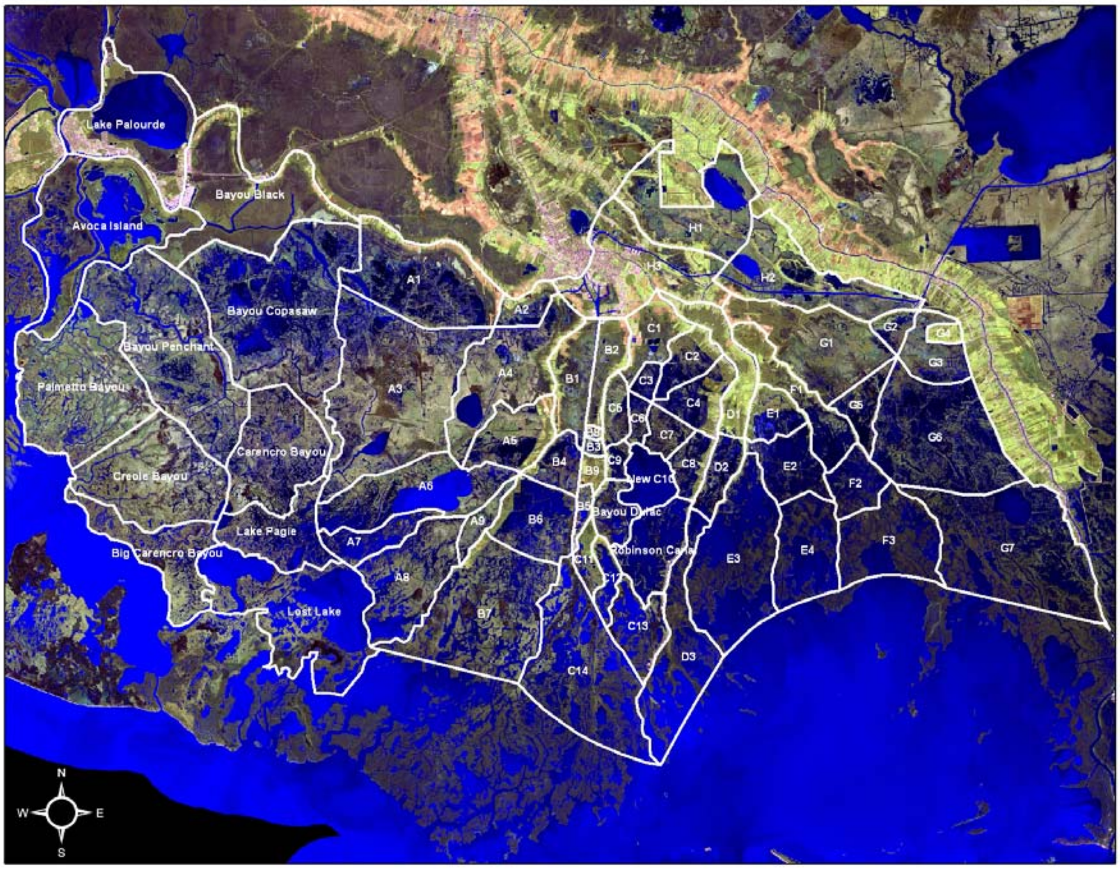


Figure 1. Map delineating study area subunits.

Wetland acreage data (1985 through 2008) was obtained from the USGS from satellite imagery for each of the study area subunits. Future-without-project (FWOP) subunit wetland acreages and marsh loss rates were determined by producing a linear trendline through the data (Figure 2) for each study area subunit. Using the trendline, marsh acreages within each study area subunit were projected from 1985 through the project life (2035 to 2085). This process applies only to coastal marshes. The conversion of forested habitats to open water or other habitat types is a much more complicated process and no simple methods are currently available to predict such habitat type changes.

The trendline projections are assumed to represent a continuation of the historic low sea level rise (SLR) scenario. However, future acreages were also calculated for two additional scenarios characterized by increasing SLR.

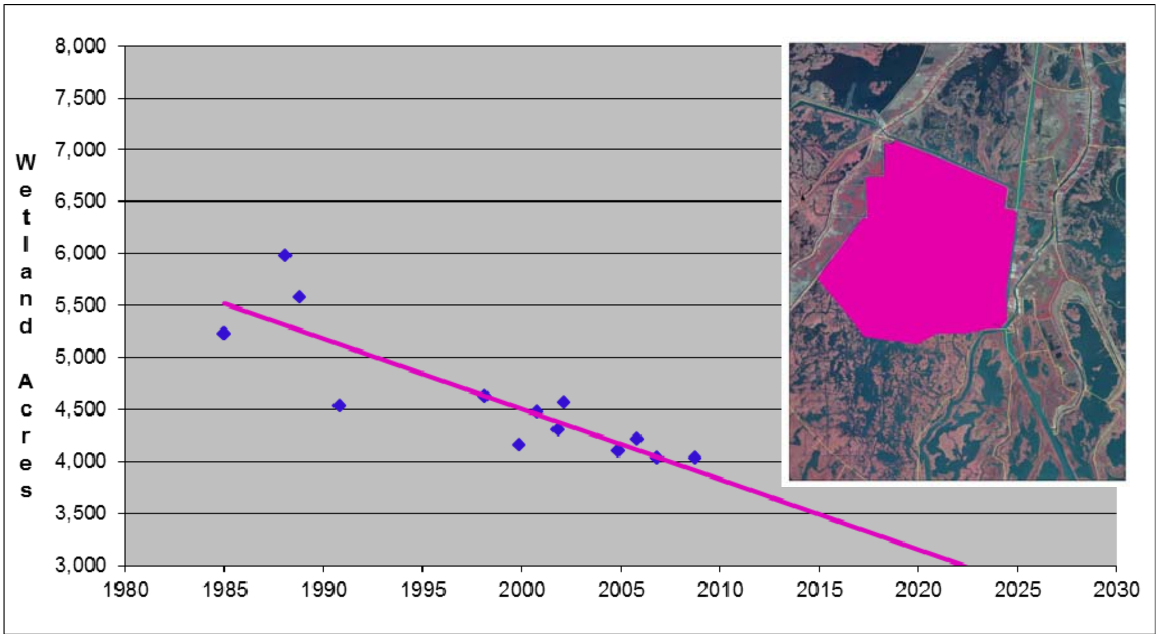


Figure 2. Observed data points and linear trendline for marshes of subunit B13.

Long-term water level gage data from the Leeville, Louisiana gage was utilized per the Corps' Engineering Circular (EC) 1165-2-212 to develop relative sea level rise associated with low (historic), intermediate, and high sea level rise estimates. According to EC guidance, the intermediate and high estimates of eustatic SLR were derived using the National Research Council (NRC) equations NRC I and NRC III, respectively. Based on the Leeville gage, the historic water level rise trend has been 6.995 mm/yr. Subtracting the historic eustatic SLR rate of 1.7 mm/yr yields a subsidence rate of 5.295 mm/yr. By adding the subsidence rate to the eustatic SLR rates associated with each SLR scenario, RSLR rates were determined for those three SLR scenarios (Figure 3).

Recent wetland loss rates (1985-2008) were assumed to have occurred under a constant low SLR rate. Therefore, for the low RSLR scenario (i.e., the continuation of the current 6.995 mm per year RSLR rate observed at the Leeville gage), the historic marsh loss rates were held constant and projected forward to provide yearly land acreages through the life of the project. For the intermediate and high scenarios, the 1985-2008 annual wetland loss rates for each subunit were gradually increased (beginning in 2010), by adding an additional annual increment of loss based on the SLR increase for that year. Those annual wetland loss rate increases were based on the slope of the negative relationship observed between wetland loss rates and RSLR rates from coastwide non-fresh marshes outside of active deltaic influences. In this relationship, RSLR was calculated as the sum of subsidence per statewide subsidence zones (see Figure 4) plus a eustatic SLR rate of 1.7

mm/yr. Recent land loss rates in percent per year were plotted against RSLR determined for those subsidence zones (Figure 5).

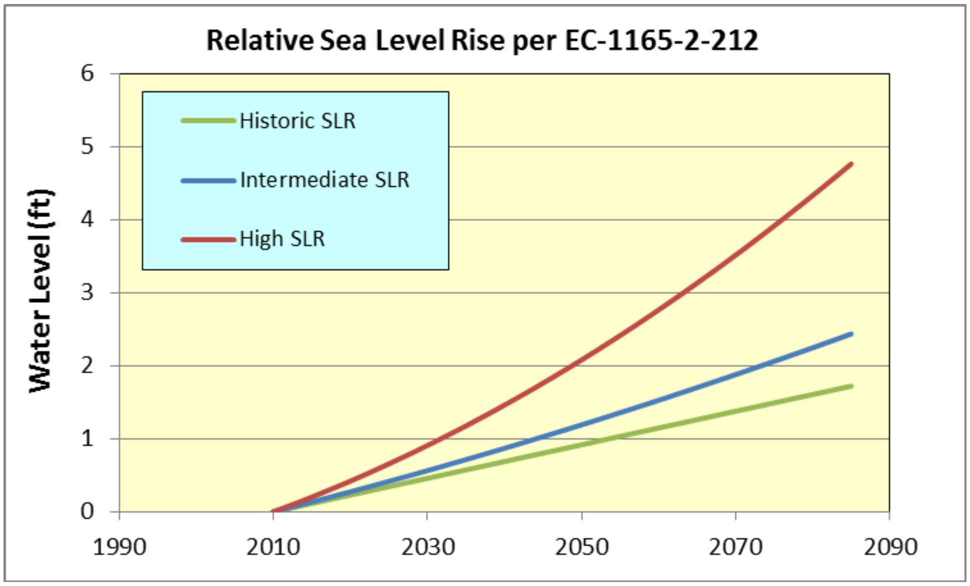


Figure 3. RSLR estimates determined using EC 1165-2-212.

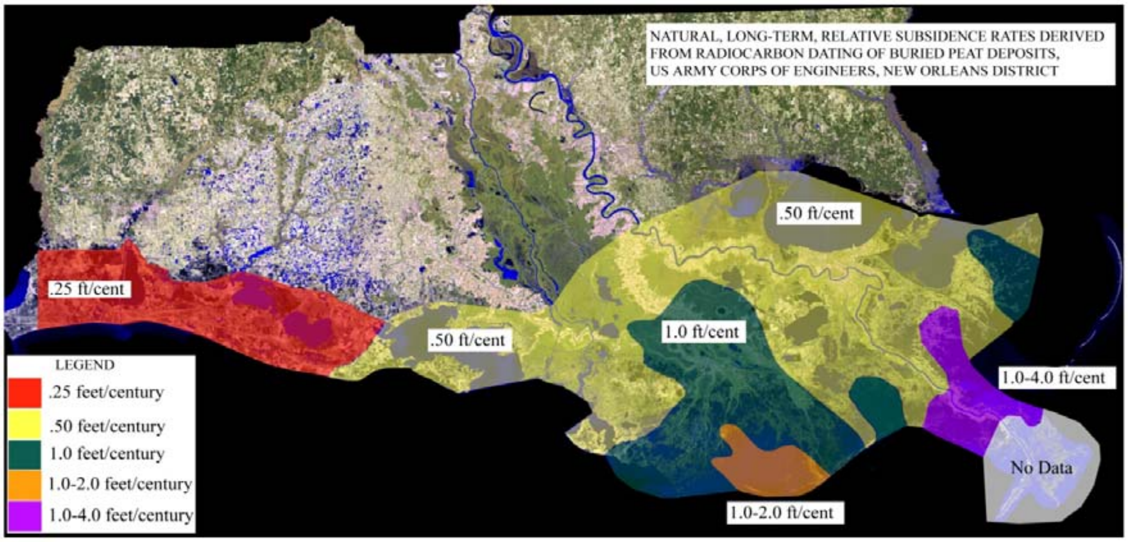


Figure 4. Coastwide subsidence zones from the Corps of Engineers.

According to the slope of this wetland loss vs RSLR relationship, every 1.0 mm/yr increase in RSLR would result in a 0.11%/yr increase in the wetland loss rate. The additional RSLR related wetland loss rate was then added to the baseline or historic loss rate to obtain total annual loss rates for each year, under the increasing sea level rise scenarios.

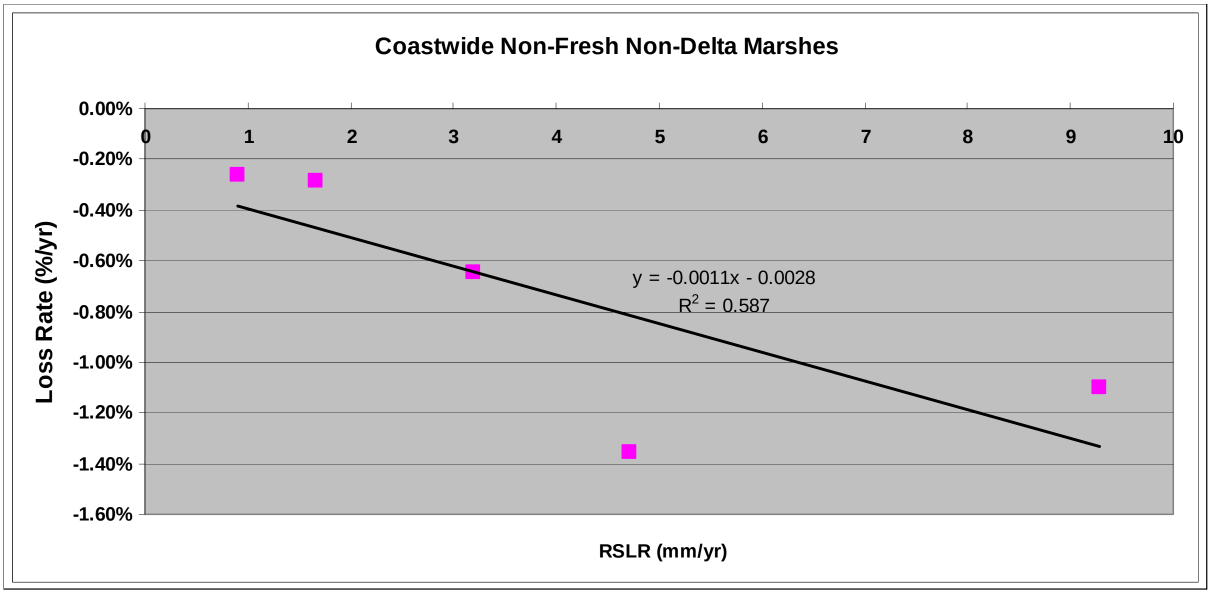


Figure 5. Coastwide wetland loss rates vs. RSLR relationship.

To determine the acreage of construction impacts in the year construction begins, National Wetland Inventory (NWI) 2008 data for the study area were obtained. Using ArcMap software, that NWI data was subdivided by each levee alternative right-of-way footprint, by individual levee reach, and by the study area loss polygons (Figure 6). The resulting data set provided acres of direct impacts in 2008, by habitat type, by levee alternative, levee reach, and loss polygon. Because of wetland loss, wetland loss rates from study area subunits, had to be applied to the 2008 NWI marsh acreages to obtain estimates of construction impacts in the year during which construction would occur.

Given the tight study schedule, the Habitat Evaluation Team (HET) agreed that the for levee segments not seeking immediate construction authorization, a tabulation of impacted habitat type acres would be sufficient for a programmatic evaluation.
However, it is desired that a detailed evaluation of levee reaches F1, F2, G1, the HNC Lock Complex and the Bayou Grand Caillou should be conducted so that those project features could be ready for authorization and construction. Accordingly, the HET decided that those features should be evaluated using the Wetland Value Assessment (WVA v1.1) methodology to assess project impacts to both habitat quantity and quality over time.

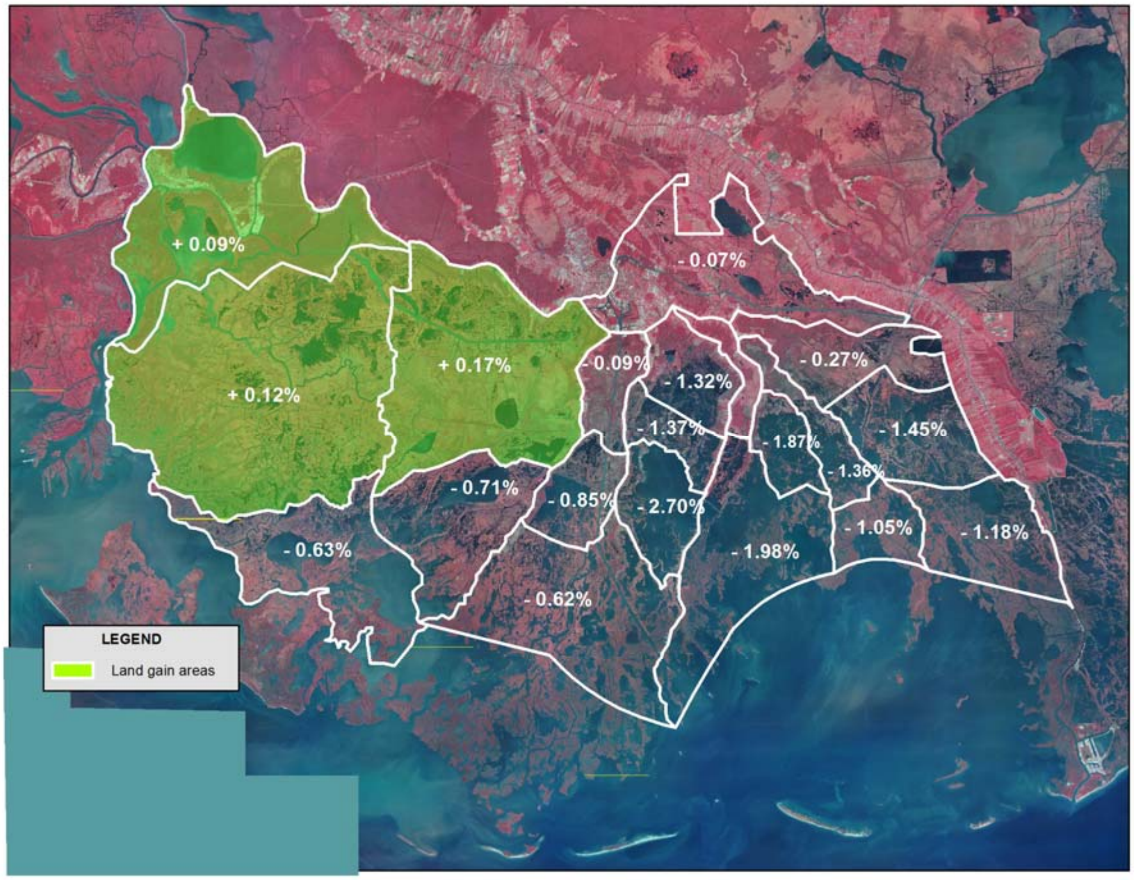


Figure 6. Land Loss Rates for each Study Area Subunit

WVA Methodology

The Wetland Value Assessment (WVA) methodology was initially developed to evaluate proposed Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) projects (LCWCRTF 2006b). The WVA methodology is similar to the Service's Habitat Evaluation Procedures (HEP), in that habitat quality and quantity are measured for baseline conditions and predicted for FWOP and FWP conditions. The Fresh/Intermediate Marsh Model and the Brackish Marsh Model were used for this project. Instead of the species-based approach of HEP, the WVA models use an assemblage of variables considered important to the suitability of a given 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 combined quantitative and qualitative estimate of project-related impacts to fish and wildlife resources.

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 habitat 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 Indices) 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).

Emergent marsh habitat models have been developed for fresh, intermediate, brackish and saline marsh types. The habitat variable-habitat suitability relationships within those WVA models have not been verified by field experiments or validated through a rigorous scientific process. However, the variables were originally derived from HEP suitability indices taken from species models for species found in that habitat type. It should also be noted that some aspects of the WVA have been defined by policy and/or functional considerations of CWPPRA. However, habitat variable-habitat suitability relationships are, in most cases, supported by scientific literature and research findings. In other cases, best professional judgment by a team of fisheries biologists, wildlife biologists, ecologists, and university scientists may have been used to determine certain habitat variable-habitat suitability relationships. In addition, the WVA models have undergone a refinement process and habitat variable-habitat suitability relationships, HSIs, and other model aspects are periodically modified as more information becomes available regarding coastal fish and wildlife habitat suitability, coastal processes, and the efficacy of restoration projects being evaluated.

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 marsh models consists of six variables: 1) percent of wetland area covered by emergent marsh; 2) percent open water covered by submerged aquatic vegetation; 3) marsh edge and interspersion; 4) percent of the open water area <= 1.5 feet deep; 5) salinity; and 6) aquatic organism access.

Target years were established when significant changes in habitat quality or quantity were expected during the project life, under FWP and FWOP conditions. Because construction of some levee segments would begin in 2015, a 70-year period would be required to evaluate impacts through the entire project life. Therefore, to evaluate project measures consistently, all measures were evaluated over a 70-year period.

The product of an HSI 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 period of analysis to determine the Average Annual Habitat Units (AAHUs) available for each habitat type.

The change in AAHUs for each FWP scenario, compared to FWOP 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.

Construction of the proposed levee segments would replace a FWOP functional marsh with a levee and borrow canal under FWP. Because the deep waters of navigation canals and major bayous are assumed to provide little if any habitat value, such waterbodies are typically excluded from the project area. Therefore, the HET assumed that the deep water of the FWP borrow canal would also be of little value, and hence, was excluded from the FWP project area. Since there would be no remaining habitat quantity or quality FWP, the final WVA results were taken as the sum of marsh + water FWOP AAHUs.

Although the WVA methodology is relatively easy to use, the study schedule did not allow for collection of field data for WVA inputs. Instead, best professional judgment (based on past site visits) was used to provide Variable 2 and Variable 4 inputs necessary to the WVA (percent submerged aquatic vegetation and percent shallow open water, respectively). Wetland acreage predictions discussed above were used to provide V1 values. However, one WVA assessed impacts to wetlands under forced drainage along Four Pointe Bayou. Those wetlands were assumed to experience no loss throughout the 70-year evaluation period.

Salinity modeling (conducted using 2004 input data) was assumed to represent baseline and construction year salinity values. The model outputs consisted of average subunit salinities at 15 minute intervals throughout the year for FWOP and for a FWP scenario with all floodgates and structures open year-round. Effects of short-term HNC Lock closures to reduce saltwater intrusion were not incorporated into the project scenarios modeled, and therefore were not reflected in FWP V5 values for the direct impact assessments. The output 15 minute salinity values were averaged as needed to provide V5 inputs. Predicted salinities under future with SLR conditions were not available within the study schedule. Hence, the HET had to assume that future salinities would remain the same as in 2004. For all levee segments, FWOP V6 was assumed to be unrestricted (V6 = 1.0). FWOP WVA variables used to assess direct impacts are listed in Tables A and B.

Table A. FWOP WVA variables for assessing direct impacts of 35-year protection features scheduled for immediate construction.

			35-Year Levee Alternative					**35-Year Levee Alternative**					**35-Year Levee Alternative**				
Levee	**Loss**	**Habitat**	**Low SLR**					**Medium SLR**					**High SLR**				
Reach	**Subunit**	**Type**	TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-2	**B13**	**INT**	V1	81	79	0	0	V1	81	79	0	0	V1	81	79	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	80	80			V3-1	80	80			V3-1	80	80		
			V3-2	10	10			V3-2	10	10			V3-2	10	10		
			V3-3	10	10			V3-3	10	10			V3-3	10	10		
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	35	35	3	0	V4	35	35	3	0	V4	35	35	2	0
			V5	0	0	0	0	V5	0	0	0	0	V5	0	0	0	0
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6					V6					V6				
			V6	1.00	1.00	1.00	1.00	V6	1.00	1.00	1.00	1.00	V6	1.00	1.00	1.00	1.00
			TOT Ac	151	151	151	151	TOT Ac	151	151	151	151	TOT Ac	151	151	151	151
			% MF	0	0	0	0	% MF	0	0	0	0	% MF	0	0	0	0
			% INT	100	100	100	100	% INT	100	100	100	100	% INT	100	100	100	100

Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-1	**B13**	**INT**	V1	88	86	0	0	V1	88	86	0	0	V1	88	86	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	20	20	1	0	V4	20	20	1	0	V4	20	20	1	0
			V5	0	0	5	5	V5	0	0	5	5	V5	0	0	5	5
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6	0	0	1	1	V6	0	0	1	1	V6	0	0	1	1
			V6	1	1	1	1	V6	1	1	1	1	V6	1	1	1	1
			TOT Ac	76	76	76	76	TOT Ac	76	76	76	76	TOT Ac	76	76	76	76
			% MF	7	7	7	7	% MF	7	7	7	7	% MF	7	7	7	7
			% INT	93	93	93	93	% INT	93	93	93	93	% INT	93	93	93	93

Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-1	**B13**	**BR**	V1	82	80	0	0	V1	82	80	0	0	V1	82	80	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	60	60	1	0	V4	60	60	1	0	V4	60	60	1	0
			V5					V5					V5				
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6					V6					V6				
			V6	1	1	1	1	V6	1	1	1	1	V6	1	1	1	1
			TOT Ac	11	11	11	11	TOT Ac	11	11	11	11	TOT Ac	11	11	11	11

Table A. FWOP WVA variables for assessing direct impacts of 35-year protection features scheduled for immediate construction – continued.

			35-Year Levee Alternative					35-Year Levee Alternative					35-Year Levee Alternative				
Levee	**Loss**	**Habitat**	**Low SLR**					**Medium SLR**					**High SLR**				
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1		70
F-1	**B15**	**BR**	V1	77	77		53	V1	77	77		41	V1	77	77		1
			V2	0	0		0	V2	0	0		0	V2	0	0		0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2				30	V3-2				20	V3-2				
			V3-3	30	30		40	V3-3	30	30		40	V3-3	30	30		
			V3-4				30	V3-4				40	V3-4				
			V3-5					V3-5					V3-5				100
			V4	15	15		6	V4	15	15		5	V4	15	15		0
			V5					V5					V5				
			V5	5	5		5	V5	5	5		5	V5	5	5		5
			V6					V6					V6				
			V6	1	1		1	V6	1	1		1	V6	1	1		1
			TOT Ac	244	244		244	TOT Ac	244	244		244	TOT Ac	244	244		244

Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	60	70
F-1	**C21**	**BR**	V1	70	70		32	V1	70	70		20	V1	70	70	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0		0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3				20	V3-3				15	V3-3				
			V3-4				80	V3-4				85	V3-4				
			V3-5					V3-5					V3-5			100	100
			V4	25	25		5	V4	25	25		3	V4	25	25	0	0
			V5					V5					V5				
			V5	8	8		8	V5	8	8		8	V5	8	8	8	8
			V6					V6					V6				
			V6	1	1		1	V6	1	1		1	V6	1	1	1	1
			TOT Ac	36	36		36	TOT Ac	36	36		36	TOT Ac	36	36	36	36

Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	60	70
F-1 Ea.	**C20**	**BR**	V1	93	93		43	V1	93	93		27	V1	93	92	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0	0	0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2					V3-2					V3-2				
			V3-3	30	30		90	V3-3	30	30			V3-3	30	30		
			V3-4				10	V3-4				30	V3-4				
			V3-5					V3-5				70	V3-5			100	100
			V4	5	5		2	V4	5	5		0	V4	5	5	0	0
			V5					V5					V5				
			V5	6	6		6	V5	6	6		6	V5	6	6	6	6
			V6					V6					V6				
			V6	1	1		1	V6	1	1		1	V6	1	1	1	1
			TOT Ac	4	4		4	TOT Ac	4	4		4	TOT Ac	4	4	4	4

Table A. FWOP WVA variables for assessing direct impacts of 35-year protection features scheduled for immediate construction – continued.

			35-Year Levee Alternative					35-Year Levee Alternative					35-Year Levee Alternative				
Levee	**Loss**	**Habitat**	**Low SLR**					**Medium SLR**					**High SLR**				
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	59	70
G-1	**C20**	**BR**	V1	80	80		36	V1	80	80		22	V1	80	79	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0	0	0
			V3-1					V3-1					V3-1				
			V3-2	100	100			V3-2	100	100			V3-2	100	100		
			V3-3				50	V3-3				30	V3-3				
			V3-4				50	V3-4				70	V3-4				
			V3-5					V3-5					V3-5			100	100
			V4	5	5		1	V4	5	5		1	V4	5	5	0	0
			V5					V5					V5				
			V5	6	6		6	V5	6	6		6	V5	6	6	6	6
			V6					V6					V6				
			V6	1	1		1	V6	1	1		1	V6	1	1	1	1
			TOT Ac	2	2		2	TOT Ac	2	2		2	TOT Ac	2	2	2	2
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	59	70
G1	**C21**	**BR**	V1	77	76		34	V1	77	76		20	V1	77	76	0	0
			V2	5	5		0	V2	5	5		0	V2	5	5	0	0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2					V3-2					V3-2				
			V3-3	30	30			V3-3	30	30			V3-3	30	30		
			V3-4				40	V3-4				30	V3-4				
			V3-5				60	V3-5				70	V3-5			100	100
			V4	7	7		2	V4	7	7		1	V4	7	7	0	0
			V5					V5					V5				
			V5	8	8		8	V5	8	8		8	V5	8	8	8	8
			V6					V6					V6				
			V6	1	1		1	V6	1	1		1	V6	1	1	1	1
			TOT Ac	143	143		143	TOT Ac	143	143		143	TOT Ac	143	143	143	143
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	TY	1		70	TY	0	1		70	TY	0	1	70	
G1	**C19**	**FM**	V1	73	73		73	V1	73	73		73	V1	73	73	73	
	Force		V2	10	10		10	V2	10	10		10	V2	10	10	10	
	Drained		V3-1	65	65		65	V3-1	65	65		65	V3-1	65	65	65	
			V3-2	35	35		35	V3-2	35	35		35	V3-2	35	35	35	
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5					V3-5					V3-5				
			V4	65	65		65	V4	65	65		65	V4	65	65	65	
			V5					V5					V5				
			V5	0	0		0	V5	0	0		0	V5	0	0	0	
			V6					V6					V6				
			V6	0	0		0	V6	0	0		0	V6	0	0	0	
			TOT Ac	19	19		19	TOT Ac	19	19		19	TOT Ac	19	19	19	
			% MF	100	100		100	% MF	100	100		100	% MF	100	100	100	
			% INT	0	0		0	% INT	0	0		0	% INT	0	0	0	

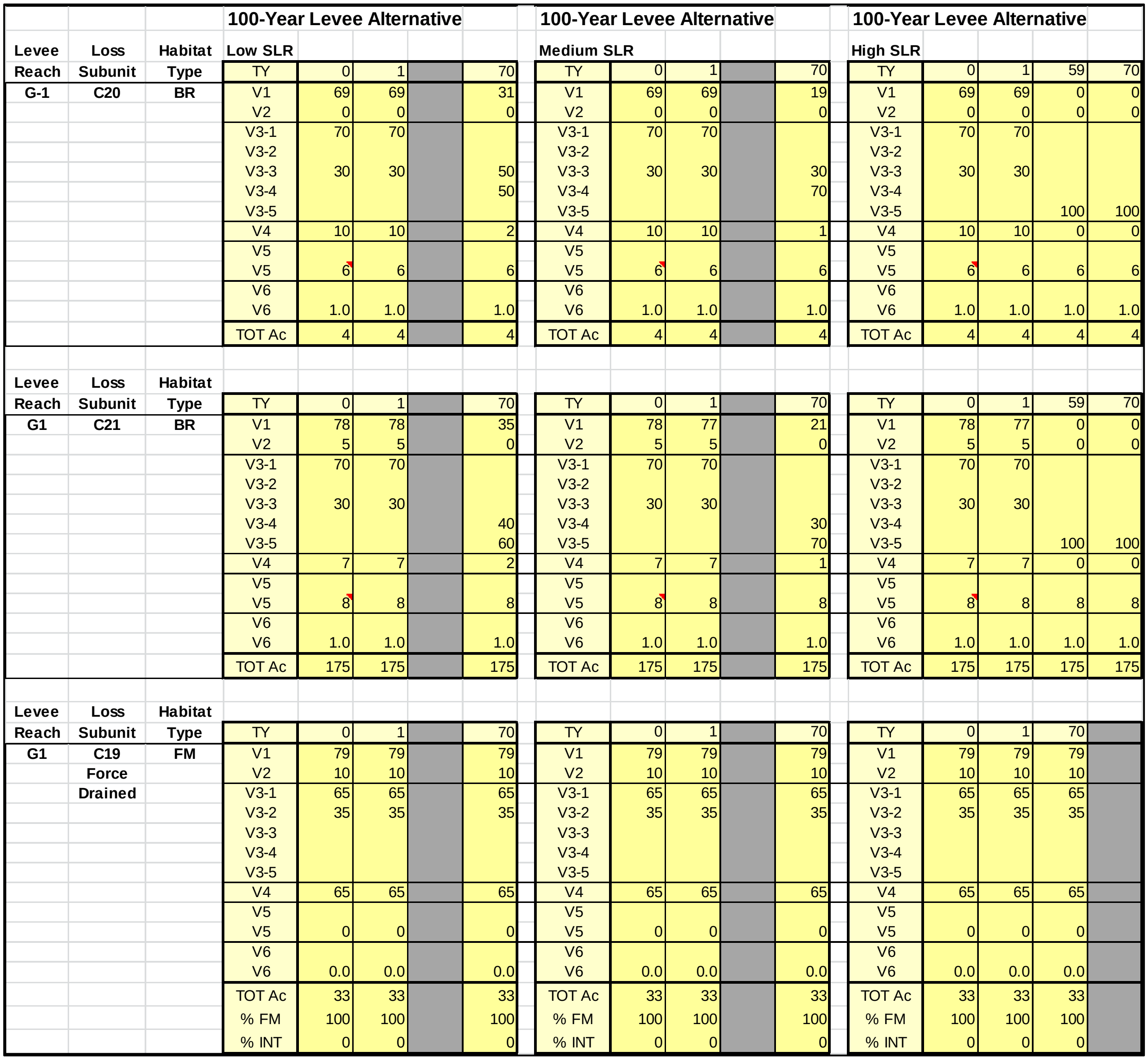
Table B. FWOP WVA variables for assessing direct impacts of 100-year protection features scheduled for immediate construction.

Levee Reach	Loss Subunit	Habitat Type	100-Year Levee Alternative Low SLR					100-Year Levee Alternative Medium SLR					100-Year Levee Alternative High SLR				
			TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-2	**B13**	**INT**	V1	79	78	0	0	V1	79	78	0	0	V1	79	78	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	85	85			V3-1	85	85			V3-1	85	85		
			V3-2	7	7			V3-2	7	7			V3-2	7	7		
			V3-3	8	8			V3-3	8	8			V3-3	8	8		
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	25	25	1	0	V4	25	25	1	0	V4	25	25	1	0
			V5	0	0	5	5	V5	0	0	5	5	V5	0	0	5	5
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6	0.0	0.0	0.0	0.0	V6	0.0	0.0	0.0	0.0	V6	0.0	0.0	0.0	0.0
			V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	188	188	188	188	TOT Ac	188	188	188	188	TOT Ac	188	188	188	188
			% FM	0	0	0	0	% FM	0	0	0	0	% FM	0	0	0	0
			% INT	100	100	100	100	% INT	100	100	100	100	% INT	100	100	100	100
Levee Reach	**Loss Subunit**	**Habitat Type**	TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-1	**B13**	**INT**	V1	86	85	0	0	V1	86	85	0	0	V1	86	85	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	20	20	1	0	V4	20	20	1	0	V4	20	20	1	0
			V5	0	0	5	5	V5	0	0	5	5	V5	0	0	5	5
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6	0	0	1	1	V6	0	0	1	1	V6	0	0	1	1
			V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	85	85	85	85	TOT Ac	85	85	85	85	TOT Ac	85	85	85	85
			% FM	4	4	4	4	% FM	4	4	4	4	% FM	4	4	4	4
			% INT	96	96	96	96	% INT	96	96	96	96	% INT	96	96	96	96
Levee Reach	**Loss Subunit**	**Habitat Type**	TY	0	1	53	70	TY	0	1	47	70	TY	0	1	38	70
F-1	**B13**	**BR**	V1	81	80	0	0	V1	81	79	0	0	V1	81	79	0	0
			V2	0	0	0	0	V2	0	0	0	0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5			100	100	V3-5			100	100	V3-5			100	100
			V4	60	60	1	0	V4	60	60	1	0	V4	60	60	1	0
			V5					V5					V5				
			V5	5	5	5	5	V5	5	5	5	5	V5	5	5	5	5
			V6					V6					V6				
			V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	12	12	12	12	TOT Ac	12	12	12	12	TOT Ac	12	12	12	12

Table B. FWOP WVA variables for assessing direct impacts of 100-year protection features scheduled for immediate construction - continued.

			100-Year Levee Alternative					100-Year Levee Alternative					100-Year Levee Alternative				
Levee	**Loss**	**Habitat**	**Low SLR**					**Medium SLR**					**High SLR**				
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1		70
F-1	**B15**	**BR**	V1	76	75		52	V1	75	75		40	V1	75	75		1
			V2	0	0		0	V2	0	0		0	V2	0	0		0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2				30	V3-2				20	V3-2				
			V3-3	30	30		40	V3-3	30	30		40	V3-3	30	30		
			V3-4				30	V3-4				40	V3-4				
			V3-5					V3-5					V3-5				100
			V4	15	15		6	V4	15	15		5	V4	15	15		0
			V5					V5					V5				
			V5	5	5		5	V5	5	5		5	V5	5	5		5
			V6					V6					V6				
			V6	1.0	1.0		1.0	V6	1.0	1.0		1.0	V6	1.0	1.0		1.0
			TOT Ac	258	258		258	TOT Ac	258	258		258	TOT Ac	258	258		258
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	60	70
F-1	**C21**	**BR**	V1	86	85		38	V1	86	85		24	V1	86	85	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3				20	V3-3				15	V3-3				
			V3-4				80	V3-4				85	V3-4				
			V3-5					V3-5					V3-5			100	100
			V4	25	25		5	V4	25	25		3	V4	25	25	0	0
			V5					V5					V5				
			V5	8	8		8	V5	8	8		8	V5	8	8	8	8
			V6					V6					V6				
			V6	1.0	1.0		1.0	V6	1.0	1.0		1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	92	92		92	TOT Ac	92	92		92	TOT Ac	92	92	92	92
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	60	70
F-1 Ea.	**C20**	**BR**	V1	93	93		43	V1	93	93		27	V1	93	92	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0	0	0
			V3-1	100	100			V3-1	100	100			V3-1	100	100		
			V3-2					V3-2					V3-2				
			V3-3				90	V3-3					V3-3				
			V3-4				10	V3-4				30	V3-4				
			V3-5					V3-5				70	V3-5			100	100
			V4	5	5		2	V4	5	5		0	V4	5	5	0	0
			V5					V5					V5				
			V5	6	6		6	V5	6	6		6	V5	6	6	6	6
			V6					V6					V6				
			V6	1.0	1.0		1.0	V6	1.0	1.0		1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	4	4		4	TOT Ac	4	4		4	TOT Ac	4	4	4	4

Table B. FWOP WVA variables for assessing direct impacts of 100-year protection features scheduled for immediate construction - continued.



			100-Year Levee Alternative					**100-Year Levee Alternative**					**100-Year Levee Alternative**				
Levee	**Loss**	**Habitat**	**Low SLR**					**Medium SLR**					**High SLR**				
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	59	70
G-1	**C20**	**BR**	V1	69	69		31	V1	69	69		19	V1	69	69	0	0
			V2	0	0		0	V2	0	0		0	V2	0	0	0	0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2					V3-2					V3-2				
			V3-3	30	30		50	V3-3	30	30		30	V3-3	30	30		
			V3-4				50	V3-4				70	V3-4				
			V3-5					V3-5					V3-5			100	100
			V4	10	10		2	V4	10	10		1	V4	10	10	0	0
			V5					V5					V5				
			V5	6	6		6	V5	6	6		6	V5	6	6	6	6
			V6					V6					V6				
			V6	1.0	1.0		1.0	V6	1.0	1.0		1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	4	4		4	TOT Ac	4	4		4	TOT Ac	4	4	4	4
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	59	70
G1	**C21**	**BR**	V1	78	78		35	V1	78	77		21	V1	78	77	0	0
			V2	5	5		0	V2	5	5		0	V2	5	5	0	0
			V3-1	70	70			V3-1	70	70			V3-1	70	70		
			V3-2					V3-2					V3-2				
			V3-3	30	30			V3-3	30	30			V3-3	30	30		
			V3-4				40	V3-4				30	V3-4				
			V3-5				60	V3-5				70	V3-5			100	100
			V4	7	7		2	V4	7	7		1	V4	7	7	0	0
			V5					V5					V5				
			V5	8	8		8	V5	8	8		8	V5	8	8	8	8
			V6					V6					V6				
			V6	1.0	1.0		1.0	V6	1.0	1.0		1.0	V6	1.0	1.0	1.0	1.0
			TOT Ac	175	175		175	TOT Ac	175	175		175	TOT Ac	175	175	175	175
Levee	**Loss**	**Habitat**															
Reach	**Subunit**	**Type**	TY	0	1		70	TY	0	1		70	TY	0	1	70	
G1	**C19**	**FM**	V1	79	79		79	V1	79	79		79	V1	79	79	79	
	Force		V2	10	10		10	V2	10	10		10	V2	10	10	10	
	Drained		V3-1	65	65		65	V3-1	65	65		65	V3-1	65	65	65	
			V3-2	35	35		35	V3-2	35	35		35	V3-2	35	35	35	
			V3-3					V3-3					V3-3				
			V3-4					V3-4					V3-4				
			V3-5					V3-5					V3-5				
			V4	65	65		65	V4	65	65		65	V4	65	65	65	
			V5					V5					V5				
			V5	0	0		0	V5	0	0		0	V5	0	0	0	
			V6					V6					V6				
			V6	0.0	0.0		0.0	V6	0.0	0.0		0.0	V6	0.0	0.0	0.0	
			TOT Ac	33	33		33	TOT Ac	33	33		33	TOT Ac	33	33	33	
			% FM	100	100		100	% FM	100	100		100	% FM	100	100	100	
			% INT	0	0		0	% INT	0	0		0	% INT	0	0	0	

Indirect Impacts WVAs

In addition to direct construction impacts, project implementation might alter hydroperiod, salinity, and fish access to enclosed wetlands. Exterior wetlands could also be affected through project-induced salinity reductions and/or salinity increases. The HET examined hydrologic model results regarding project-induced water level changes. There was little if any change, and the HET assumed that those changes were not significant. Consequently, the HET did not attempt to assess impacts associated with project-induced changes in hydroperiod.

The HET also examined predicted salinity changes for subunits inside and outside the levee system. Because FWP salinities did not include the anticipated short-term HNC Lock closures to provide saltwater intrusion protection, the HET merged salinity outputs from a model run where the Lock was closed year-round with Plan 1 outputs (all gates open year-round) to create a Modified Plan 1 salinity output. Due to widely varying estimates of Lock closure duration, substantial uncertainty regarding Modified Plan 1 salinities, and the relatively minor change in predicted Modified Plan 1 salinities (which used a liberal estimate of lock closure duration), the HET decided that project-induced salinity reductions were too uncertain to quantify at this time. Predicted salinity increases were noted for marshes south of the Lock, during lock closure periods. However, the salinities remained within the optimal brackish marsh range according to WVA models. As a result, the HET decided not to assess benefits or impacts associated with project-induced salinity increases or decreases.

Because all Morganza floodgates and environmental structures would be closed only upon approach of a tropical storm, fisheries access interruptions would occur on average roughly 1 or 2 days per year. However, the duration of HNC Lock closures to reduce saltwater intrusion would likely be greater, and could result in quantifiable fish access interruptions. However, there were substantial uncertainties regarding the duration of lock closures. Additionally, effects of HNC Lock closures would potentially be reduced because the adjoining Bayou Grand Caillou floodgate would remain open to provide fish access. Lacking more definitive information on project-induced water exchange flux, the HET decided that the uncertainties were too great to propose project-induced reductions in fisheries access. As a result of its evaluations, the HET decided not to quantify any indirect impacts or indirect benefits associated with project implementation due to hydrology changes or fisheries access reductions

Mitgation WVAs.

To compensate for marsh losses associated with construction of levee reaches F1, F2, G1, the HNC Lock, and the Bayou Grand Caillou Floodgate, the HET evaluated several marsh creation projects under the medium SLR scenario. Construction impacts to fresh and intermediate marshes would be mitigated by marsh creation in the intermediate marshes of subunit B13 (open water areas south of Falgout Canal). Construction impacts to brackish marshes would be mitigated via marsh creation in the Felix Lake area (subunit B15 open water area immediately west of the HNC Lock). WVA variables used to quantify benefits of proposed marsh creation measures are provided in Table C.

Table C. WVA variables used to determine benefits of potential marsh creation mitigation projects.

		Medium SLR				Medium SLR					
Loss Subunit	**Habitat Type**		FWOP TY0	FWOP TY1	FWOP TY70	FWP TY1	FWP TY3	FWP TY5	FWP TY6	FWP TY32	FWP TY70
B13	**INT**	V1	0	0	0	10	25	97	96	77	19
		V2	0	0	0	0	0	0	0	0	0
		V3-1						50	100	77	
		V3-2								23	
		V3-3					100	50			
		V3-4									15
		V3-5	100	100	100	100					85
		V4	20	20	0	100	100	100	100	100	5
		V5	0	0	0	0	0	0	0	0	0
		V5	5	5	5	4	4	4	4	4	4
		V6									
		V6	1.00	1.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00
		TOT Ac	100	100	100	100	100	100	100	100	100
		% FM	0	0	0	0	0	0	0	0	0
		% INT	100	100	100	100	100	100	100	100	100

Loss Subunit	**Habitat Type**		FWOP TY0	FWOP TY1	FWOP TY70	FWP TY1	FWP TY3	FWP TY5	FWP TY6	FWP TY32	FWP TY70
B15	**BR**	V1	0	0	0	10	25	99	99	90	64
		V2	0	0	0	0	0	0	0	0	0
		V3-1	70	70				50	100	90	
		V3-2			20					10	25
		V3-3	30	30	40		100	50			75
		V3-4			40						
		V3-5				100					
		V4	60	60	0	100	100	100	100	100	70
		V5									
		V5	5	5	5	4	4	4	4	4	4
		V6									
		V6	1	1	1	0.00	0.00	1	1	1	1
		TOT Ac	500	500	500	500	500	500	500	500	500

Predicting Future Acreage of Marsh Creation Mitigation Projects

Mathematical formulas were developed for use in Excel spreadsheets to calculate net marsh creation project acres over time. A number of assumptions regarding loss rate reduction and the rate at which vegetation colonizes the created marsh platform were incorporated into those formulas and calculate the acres of functioning marsh for every year of the project life. To include the additional marsh loss under the medium and high SLR scenarios, the formulas under those scenarios were more complex than the formulas to calculate marsh creation acres under the low SLR scenario.

Marsh Creation Assumptions:

a) The created marsh loss rate is initially 50% of the loss rate of surrounding marshes provided that accretion above the created marsh platform is less than 10 inches.

b) The loss rate of created marsh will revert to background or baseline loss rates once 10 inches or more of post-construction accretion has occurred above the constructed marsh platform.

c) Given a study area average accretion rate of 0.91 cm/yr (Table D), and assuming an initial 3-yr settling period, 31 years is required to accrete 10 inches of soil above the created marsh platform. Prior to that time, loss rate is 50% of the background loss rate. Once 10 inches of soil has accreted, the loss rate reverts back to 100% of the background rate.

d) The FWOP condition is assumed to be all open water. Consequently, no formulas are needed to calculate FWOP marsh loss over time.

e) Functionality/vegetation of the created brackish marsh is per standard planted marsh protocols (TY1 = 10%, TY3=25%, TY5= 100%).

f) Functionality/vegetation of the created intermediate marsh is per standard planted marsh protocols (TY1= 10%, TY3=25%, TY5=100%).

g) Percent functionality for TY2 and TY4 is assumed to be midway between percent functionality values for the year before and after (TY2 is 18% and TY4 is 63%).

h) Loss of constructed marsh platform assumed to occur immediately after construction (at 50% of the marsh loss rate), independent of percent functionality/vegetation.

Formula inputs include:

1. AC – the acres of marsh to be created.
2. YC - year in which the marsh creation project is constructed.
3. MCLR - marsh creation loss rate in acres/yr. Calculated as (Polygon loss rate * Created acres)*50%. A loss rate is indicated by a negative value.
4. RCH - year FWP loss rate reverts from 50% of the polygon loss rate to 100% of the polygon loss rate. This year is calculated as the YC + 31 years.
5. YR – calendar year
6. SLR – additional loss rate due to increased sea level rise under the medium and high SLR scenarios (see Figure 5 and associated discussion above). SLR values increase each year after sea level rise acceleration begins in 2010.
7. PAC - prior year’s marsh creation acreage.

Table D. Terrebonne Basin marsh soil accretion measurements from Jarvis (2010).

Location	**Time Period**	**Habitat Type**	**Method**	**(cm/yr)**	**Reference**
Deteriorating brackish	1989-1994	Brackish	137Cs	0.96	Nyman et al., 2006
Stable brackish	1989-1994	Brackish	137Cs	0.88	Nyman et al., 2006
N Billy Goat Bay	1963-1990	Brackish/saline	137Cs	1.06	Nyman et al., 1993
N Madison Bay	1963-1990	Brackish/saline	137Cs	1.33	Nyman et al., 1993
SE Madison Bay	1963-1990	Brackish/saline	137Cs	0.67	Nyman et al., 1993
W Madison Bay	1963-1990	Brackish/saline	137Cs	0.78	Nyman et al., 1993
Bay la Peur	1963-1990	Saline	137Cs	0.78	Nyman et al., 1993
Charles Theriot	1963-1990	Saline	137Cs	0.98	Nyman et al., 1993
Chitigue (upstream)	1963-1990	Saline	137Cs	1.22	Nyman et al., 1993
Chitigue (midstream)	1963-1990	Saline	137Cs	0.75	Nyman et al., 1993
Chitigue (downstream)	1963-1990	Saline	137Cs	0.98	Nyman et al., 1993
deMangue (upstream)	1963-1990	Saline	137Cs	0.94	Nyman et al., 1993
deMangue (midstream)	1963-1990	Saline	137Cs	1.28	Nyman et al., 1993
deMangue (downstream)	1963-1990	Saline	137Cs	0.56	Nyman et al., 1993
DuFrene	1963-1990	Saline	137Cs	0.55	Nyman et al., 1993
Fourleauge Bay	1975-1979	Saline	137Cs	0.66	Baumann et al., 1984
Grand Bayou	1963-1990	Saline	137Cs	1.04	Nyman et al., 1993
Lake Barre	1963-1990	Saline	137Cs	1.78	Nyman et al., 1993
Old Oyster Bayou	1992-2000	Saline	137Cs	0.48	Rybczyk and Cahoon, 2002
Stable saline	1989-1994	Saline	137Cs	0.59	Nyman et al., 2006
			Average =	**0.91**	

<u>FWP Excel Formula for Marsh Creation Acres – Low SLR Scenario</u>:
=IF(YR<YC,0,IF(YR=YC,(AC+MCLR)*0.1,IF(YR=YC+1,(AC+2*MCLR)*0.18,IF(YR=YC+2,(AC+3*MCLR)*0.25,IF(YR=YC+3,(AC+4*MCLR)*0.63,IF(YR=YC+4,(AC+5*MCLR),IF(YR<RCH,IF(PAC+MCLR<0,0,PAC+MCLR),IF(PAC+2*MCLR<0,0,PAC+2*MCLR)))))))).

<u>FWP Excel Formula for Marsh Creation Acres – Medium and High Scenario</u>:
=IF(YR<YC,0,IF(YR=YC,(AC+MCLR+SLR*AC)*0.1,IF(YR=YC+1,(AC+2*MCLR+SLR*AC)*0.18, IF(YR=YC+2,(AC+3*MCLR+SLR*AC)*0.25,IF(YR=YC+3,(AC+4*MCLR+SLR*AC)*0.63, IF(YR=YC+4,(AC+5*MCLR+SLR*AC),IF(YR<RCH,IF(PAC+MCLR+AC*SLR<0,0,PAC+MCLR+AC*SLR),IF(PAC+2MCLR+AC*SLR<0,0,PAC+MCLR+AC*SLR)))))))).

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Low SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

3% Levee Reach	Fresh Hwds (acres)	Swamp (acres)	Marsh (acres)	Tidal Habitats Water* (acres)	INT Marsh (acres)	Tidal Habitats Water* (acres)	BR Habitats Marsh (acres)	Tidal Water* (acres)	SAL Marsh (acres)	Tidal Habitats Water* (acres)	Force Drained Marsh (acres)	(non-tidal) Water (acres)	Total Tidal Water* acres	Total Tidal Marsh acres	Total Marsh (acres)	**Total Mitigation**	**Marsh Created with Constr$$**	Net marsh	Total Mitigation after marsh created with Constr$$
Barrier	170.00	475.06	157.46	6.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.07	157.46	**157.46**				
A	65.18	50.89	305.59	38.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.51	305.59	**305.59**				
B	0.00	0.00	103.37	14.65	26.73	112.30	0.00	0.00	0.00	0.00	0.00	37.41	126.95	130.10	**130.10**				
E-1	0.00	0.00	0.00	0.00	56.01	135.57	0.00	0.00	0.00	0.00	0.00	0.00	135.57	56.01	**56.01**				
E-2	0.00	0.00	0.00	0.00	9.36	154.43	0.00	0.00	0.00	0.00	0.00	1.38	154.43	9.36	**9.36**				
F-1	0.00	0.00	0.00	0.00	74.58	15.69	216.70	67.68	0.00	0.00	0.00	0.00	83.37	291.28	**291.28**				
F-2	0.00	0.00	0.00	0.00	119.80	31.64	0.00	0.00	0.00	0.00	0.00	0.00	31.64	119.80	**119.80**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	110.80	34.73	0.00	0.00	14.06	5.10	34.73	110.80	**124.86**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.53	63.27	0.00	0.00	63.27	28.53	**28.53**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.40	16.20	0.00	0.00	16.20	33.40	**33.40**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.43	53.35	0.00	0.00	53.35	83.43	**83.43**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	138.14	71.95	0.00	0.00	71.95	138.14	**138.14**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.74	192.95	0.00	0.00	192.95	73.74	**73.74**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	74.36	73.47	0.39	0.20	0.00	0.15	73.67	74.75	**74.75**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.00	95.15	0.00	0.91	95.15	66.00	**66.00**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.15	109.55	0.00	0.00	109.55	69.15	**69.15**				
J-1	0.00	0.00	0.00	0.00	39.97	151.21	0.00	0.00	1.56	10.33	0.00	0.25	161.54	41.53	**41.53**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	25.86	177.14	24.51	157.09	17.25	1.29	334.23	50.37	**67.62**				
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.65	89.83	0.00	0.00	89.83	17.65	**17.65**				
K	0.00	0.00	0.00	0.00	0.00	0.00	88.84	413.09	0.00	0.00	0.00	0.20	413.09	88.84	**88.84**				
L	0.00	0.00	0.00	0.00	70.99	35.22	70.80	101.57	0.00	0.00	0.00	5.36	136.79	141.79	**141.79**				
Total previous	235.18	525.95	566.42	59.23	397.44	636.06	587.36	867.68	536.50	859.87	31.31	52.05	2,422.84	2,087.72	2,119.03	2,880.16	**1,175.00**	944.03	1,705.16
Mitigation	$ 52,209,960	$ 58,380,450													$ 169,522,400	$ 280,112,810		$ 75,522,400	$ 186,112,810
Monitoring	$ 658,504	$ 1,472,660													$ 5,933,284	$ 8,064,448		$ 5,933,284	$ 8,064,448
LG	23.85	0.00	0.00	0.00	18.68	0.70	0.00	0.00	0.00	0.00	0.00	11.13	0.70	18.68	**18.68**	42.53			42.53
Mitigation	$ 5,294,700	$ -													$ 1,494,400	6,789,100.00			$ 6,789,100
Monitoring	$ 66,780	$ -													$ 52,304	119,084.00			$ 119,084
LL	171.06	35.66	85.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.00	85.67	**85.67**	292.39			292.39
Mitigation	$ 37,975,320	$ 3,958,260													$ 6,853,600	$ 48,787,180			$ 48,787,180
Monitoring	$ 478,968	$ 99,848													$ 239,876	$ 818,692			$ 818,692
TOTAL	430.09	561.61	652.09	59.23	416.12	636.76	587.36	867.68	536.50	859.87	31.31	66.02	2,423.54	2,192.07	**2,223.38**	3,215.08			2,040.08
Mitigation	$ 95,479,980	$ 62,338,710													$ 177,870,400	$ 335,689,090			$ 241,689,090
Monitoring	$ 1,204,252	$ 1,572,508													$ 6,225,464	$ 9,002,224			$ 9,002,224

Low SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

1% Levee Reach	Fresh Hwds (acres)	Swamp (acres)	Marsh (acres)	Tidal Habitats Water* (acres)	INT Marsh (acres)	Tidal Habitats Water* (acres)	BR Habitats Marsh (acres)	Tidal Water* (acres)	SAL Marsh (acres)	Tidal Habitats Water* (acres)	Force Drained Marsh (acres)	(non-tidal) Water (acres)	Total Tidal Water* acres	Total Tidal Marsh acres	Total Marsh (acres)	**Total Mitigation**	**Marsh Created with Constr$$**	Net marsh	Total Mitigation after marsh created with Constr$$
Barrier	201.87	547.48	208.82	47.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.90	208.82	**208.82**				
A	80.52	12.89	361.65	43.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.00	361.65	**361.65**				
B	0.00	0.00	143.61	19.50	38.71	150.57	0.00	0.00	0.00	0.00	0.00	38.95	170.07	182.32	**182.32**				
E-1	0.00	0.00	0.00	0.00	93.87	191.04	0.00	0.00	0.00	0.00	0.00	0.00	191.04	93.87	**93.87**				
E-2	0.00	0.00	0.00	0.00	38.80	215.69	0.00	0.00	0.00	0.00	0.00	4.16	215.69	38.80	**38.80**				
F-1	0.00	0.00	0.00	0.00	83.58	16.33	275.69	78.16	0.00	0.00	0.00	0.00	94.49	359.27	**359.27**				
F-2	0.00	0.00	0.00	0.00	146.71	41.58	0.00	0.00	0.00	0.00	0.00	0.00	41.58	146.71	**146.71**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	138.74	40.68	0.00	0.00	26.39	0.00	40.68	138.74	**165.13**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.67	95.89	0.00	0.00	95.89	52.67	**52.67**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.94	28.74	0.00	0.00	28.74	42.94	**42.94**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	112.08	79.04	0.00	0.00	79.04	112.08	**112.08**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	186.61	106.34	0.00	0.00	106.34	186.61	**186.61**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.52	119.39	0.00	0.00	119.39	102.52	**102.52**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	82.63	100.54	0.41	0.22	0.00	0.15	100.76	83.04	**83.04**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.32	139.14	0.00	0.91	139.14	86.32	**86.32**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.63	143.58	0.00	0.00	143.58	90.63	**90.63**				
J-1	0.00	0.00	0.00	0.00	79.26	216.48	0.00	0.00	1.96	12.77	2.36	0.76	229.25	81.22	**83.58**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	40.39	299.67	34.52	200.03	28.28	2.04	499.70	74.91	**103.19**				
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.58	123.15	0.00	4.34	123.15	25.58	**25.58**				
K	0.00	0.00	0.00	0.00	0.00	0.00	138.99	551.99	0.00	0.00	0.00	0.37	551.99	138.99	**138.99**				
L	0.00	0.00	0.00	0.00	105.49	69.51	106.92	127.52	0.00	0.00	0.00	6.84	197.03	212.41	**212.41**				
Total previous	282.39	560.37	714.08	110.40	586.42	901.21	783.36	1,198.56	736.24	1,048.29	57.03	58.52	3,258.45	2,820.10	2,877.13	3,719.89	**1,175.00**	1,702.13	2,544.89
Mitigation	$ 62,690,580	$ 62,201,070													$ 230,170,400	$ 355,062,050		$ 136,170,400	$ 261,062,050
Monitoring	$ 790,692	$ 1,569,036													$ 8,055,964	$ 10,415,692		$ 8,055,964	$ 10,415,692
LG	50.95	0.00	0.00	0.00	29.69	1.11	0.00	0.00	0.00	0.00	0.00	18.39	1.11	29.69	**29.69**	80.64			80.64
Mitigation	$ 11,310,900	$ -													$ 2,375,200	13,686,100.00			$ 13,686,100
Monitoring	$ 142,660	$ -													$ 83,132	225,792.00			$ 225,792
LL	186.92	38.92	88.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.00	88.72	**88.72**	314.56			314.56
Mitigation	$ 41,496,240	$ 4,320,120													$ 7,097,600	$ 52,913,960			$ 52,913,960
Monitoring	$ 523,376	$ 108,976													$ 248,416	$ 880,768			$ 880,768
TOTAL	520.26	599.29	802.80	110.40	616.11	902.32	783.36	1,198.56	736.24	1,048.29	57.03	79.75	3,259.56	2,938.51	**2,995.54**	4,115.09			2,940.09
Mitigation	$ 115,497,720	$ 66,521,190													$ 239,643,200	$ 421,662,110			$ 327,662,110
Monitoring	$ 1,456,728	$ 1,678,012													$ 8,387,512	$ 11,522,252			$ 11,522,252

Intermediate SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

					INT	Tidal	BR	Tidal	SAL	Tidal			Total	Total	Total				
	Fresh			Tidal Habitats	Habitats		Habitats		Habitats		Force Drained	(non-tidal)	Tidal	Tidal	Marsh				
	Hwds	Swamp	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water	Water*	Marsh					
3% Levee Reach	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	acres	acres	(acres)				
Barrier	170.00	475.06	157.05	6.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.48	157.05	**157.05**				
A	65.18	50.89	305.02	39.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.08	305.02	**305.02**				
B	0.00	0.00	103.31	14.65	26.72	112.37	0.00	0.00	0.00	0.00	0.00	37.41	127.02	130.03	**130.03**				
E-1	0.00	0.00	0.00	0.00	55.97	135.61	0.00	0.00	0.00	0.00	0.00	0.00	135.61	55.97	**55.97**				
E-2	0.00	0.00	0.00	0.00	9.36	154.43	0.00	0.00	0.00	0.00	0.00	1.38	154.43	9.36	**9.36**				
F-1	0.00	0.00	0.00	0.00	74.53	15.74	216.56	67.82	0.00	0.00	0.00	0.00	83.56	291.09	**291.09**				
F-2	0.00	0.00	0.00	0.00	119.70	31.74	0.00	0.00	0.00	0.00	0.00	0.00	31.74	119.70	**119.70**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	110.69	34.84	0.00	0.00	14.06	5.10	34.84	110.69	**124.75**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.50	63.30	0.00	0.00	63.30	28.50	**28.50**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.37	16.23	0.00	0.00	16.23	33.37	**33.37**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.38	53.40	0.00	0.00	53.40	83.38	**83.38**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	138.02	72.07	0.00	0.00	72.07	138.02	**138.02**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.68	193.01	0.00	0.00	193.01	73.68	**73.68**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	74.30	73.53	0.39	0.20	0.00	0.15	73.73	74.69	**74.69**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.89	95.26	0.00	0.91	95.26	65.89	**65.89**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.03	109.67	0.00	0.00	109.67	69.03	**69.03**				
J-1	0.00	0.00	0.00	0.00	39.94	151.24	0.00	0.00	1.56	10.33	0.00	0.25	161.57	41.50	**41.50**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	25.85	177.15	24.47	157.13	17.25	1.29	334.28	50.32	**67.57**	**3% alternative**			
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.61	89.87	0.00	0.00	89.87	17.61	**17.61**	**Total Mitigation**	**Marsh**	Net marsh	Total Mitigation
K	0.00	0.00	0.00	0.00	0.00	0.00	88.76	413.17	0.00	0.00	0.00	0.20	413.17	88.76	**88.76**		**Created**		after marsh created
L	0.00	0.00	0.00	0.00	70.87	35.34	70.67	101.70	0.00	0.00	0.00	5.36	137.04	141.54	**141.54**		**with Constr$$**		with Constr$$
Total previous	235.18	525.95	565.38	60.21	397.09	636.47	586.83	868.21	535.90	860.47	31.31	52.05	2,425.36	2,085.20	2,116.51	2,877.64	**1,175.00**	941.51	1,702.64
Mitigation	$ 52,209,960	$ 58,380,450													$ 169,320,800	$ 279,911,210		$ 75,320,800	$ 185,911,210
Monitoring	$ 658,504	$ 1,472,660													$ 5,926,228	$ 8,057,392		$ 5,926,228	$ 8,057,392
LG	23.85	0.00	0.00	0.00	18.67	0.71	0.00	0.00	0.00	0.00	0.00	11.13	0.71	18.67	**18.67**	42.52			42.52
Mitigation	$ 5,294,700	$ -													$ 1,493,600	6,788,300.00			$ 6,788,300
Monitoring	$ 66,780	$ -													$ 52,276	119,056.00			$ 119,056
LL	171.06	35.66	85.64	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.03	85.64	**85.64**	292.36			292.36
Mitigation	$ 37,975,320	$ 3,958,260													$ 6,851,200	$ 48,784,780			$ 48,784,780
Monitoring	$ 478,968	$ 99,848													$ 239,792	$ 818,608			$ 818,608
TOTAL	430.09	561.61	651.02	60.24	415.76	637.18	586.83	868.21	535.90	860.47	31.31	66.02	2,426.10	2,189.51	**2,220.82**	3,212.52			2,037.52
Mitigation	$ 95,479,980	$ 62,338,710													$ 177,665,600	$ 335,484,290			$ 241,484,290
Monitoring	$ 1,204,252	$ 1,572,508													$ 6,218,296	$ 8,995,056			$ 8,995,056

Intermediate SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

					INT	Tidal	BR	Tidal					Total	Total	Total				
	Fresh			Tidal Habitats	Habitats		Habitats		SAL	Tidal Habitats	Force Drained	(non-tidal)	Tidal	Tidal	Marsh				
	Hwds	Swamp	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water	Water*	Marsh					
1% Levee Reach	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	acres	acres	(acres)				
Barrier	201.87	547.48	208.70	48.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.02	208.70	**208.70**				
A	80.52	12.89	361.46	43.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.19	361.46	**361.46**				
B	0.00	0.00	143.53	19.51	38.69	150.66	0.00	0.00	0.00	0.00	0.00	38.95	170.17	182.22	**182.22**				
E-1	0.00	0.00	0.00	0.00	93.80	191.11	0.00	0.00	0.00	0.00	0.00	0.00	191.11	93.80	**93.80**				
E-2	0.00	0.00	0.00	0.00	38.77	215.72	0.00	0.00	0.00	0.00	0.00	4.16	215.72	38.77	**38.77**				
F-1	0.00	0.00	0.00	0.00	83.52	16.39	275.52	78.33	0.00	0.00	0.00	0.00	94.72	359.04	**359.04**				
F-2	0.00	0.00	0.00	0.00	146.59	41.70	0.00	0.00	0.00	0.00	0.00	0.00	41.70	146.59	**146.59**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	138.60	40.82	0.00	0.00	26.39	0.00	40.82	138.60	**164.99**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.61	95.95	0.00	0.00	95.95	52.61	**52.61**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.89	28.79	0.00	0.00	28.79	42.89	**42.89**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	111.99	79.13	0.00	0.00	79.13	111.99	**111.99**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	186.44	106.51	0.00	0.00	106.51	186.44	**186.44**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.43	119.48	0.00	0.00	119.48	102.43	**102.43**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	82.56	100.61	0.41	0.22	0.00	0.15	100.83	82.97	**82.97**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.18	139.28	0.00	0.91	139.28	86.18	**86.18**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.47	143.74	0.00	0.00	143.74	90.47	**90.47**				
J-1	0.00	0.00	0.00	0.00	79.20	216.54	0.00	0.00	1.96	12.77	2.36	0.76	229.31	81.16	**83.52**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	40.36	299.70	34.46	200.09	28.28	2.04	499.79	74.82	**103.10**	**1 % alternative**			
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.53	123.20	0.00	4.34	123.20	25.53	**25.53**	**Total Mitigation**	**Marsh**	Net marsh	Total Mitigation
K	0.00	0.00	0.00	0.00	0.00	0.00	138.88	552.10	0.00	0.00	0.00	0.37	552.10	138.88	**138.88**		**Created**		after marsh created
L	0.00	0.00	0.00	0.00	105.40	69.60	106.81	127.63	0.00	0.00	0.00	6.84	197.23	212.21	**212.21**		**with Constr$$**		with Constr$$
Total previous	282.39	560.37	713.69	110.72	585.97	901.73	782.73	1,199.19	735.37	1,049.16	57.03	58.52	3,260.79	2,817.76	2,874.79	3,717.55	**1,175.00**	1,699.79	2,542.55
Mitigation	$ 62,690,580	$ 62,201,070													$ 229,983,200	$ 354,874,850		$ 135,983,200	$ 260,874,850
Monitoring	$ 790,692	$ 1,569,036													$ 8,049,412	$ 10,409,140		$ 8,049,412	$ 10,409,140
LG	50.95	0.00	0.00	0.00	29.67	1.13	0.00	0.00	0.00	0.00	0.00	18.39	1.13	29.67	**29.67**	80.62			80.62
Mitigation	$ 11,310,900	$ -													$ 2,373,600	13,684,500.00			$ 13,684,500
Monitoring	$ 142,660	$ -													$ 83,076	225,736.00			$ 225,736
LL	186.92	38.92	88.69	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.03	88.69	**88.69**	314.53			314.53
Mitigation	$ 41,496,240	$ 4,320,120													$ 7,095,200	$ 52,911,560			$ 52,911,560
Monitoring	$ 523,376	$ 108,976													$ 248,332	$ 880,684			$ 880,684
TOTAL	520.26	599.29	802.38	110.75	615.64	902.86	782.73	1,199.19	735.37	1,049.16	57.03	79.75	3,261.95	2,936.12	2,993.15	4,112.70			2,937.70
Mitigation	$ 115,497,720	$ 66,521,190													$ 239,452,000	$ 421,470,910			$ 327,470,910
Monitoring	$ 1,456,728	$ 1,678,012													$ 8,380,820	$ 11,515,560			$ 11,515,560

High SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

					INT	Tidal	BR	Tidal	SAL	Tidal			Total	Total	Total				
	Fresh			Tidal Habitats	Habitats		Habitats		Habitats		Force Drained	(non-tidal)	Tidal	Tidal	Marsh				
	Hwds	Swamp	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water	Water*	Marsh					
3% Levee Reach	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	acres	acres	(acres)				
Barrier	170.00	475.06	155.71	7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.82	155.71	**155.71**				
A	65.18	50.89	303.14	40.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.96	303.14	**303.14**				
B	0.00	0.00	103.12	14.68	26.67	112.58	0.00	0.00	0.00	0.00	0.00	37.41	127.26	129.79	**129.79**				
E-1	0.00	0.00	0.00	0.00	55.82	135.76	0.00	0.00	0.00	0.00	0.00	0.00	135.76	55.82	**55.82**				
E-2	0.00	0.00	0.00	0.00	9.34	154.45	0.00	0.00	0.00	0.00	0.00	1.38	154.45	9.34	**9.34**				
F-1	0.00	0.00	0.00	0.00	74.34	15.93	216.14	68.24	0.00	0.00	0.00	0.00	84.17	290.48	**290.48**				
F-2	0.00	0.00	0.00	0.00	119.38	32.06	0.00	0.00	0.00	0.00	0.00	0.00	32.06	119.38	**119.38**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	110.34	35.19	0.00	0.00	14.06	5.10	35.19	110.34	**124.40**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.41	63.39	0.00	0.00	63.39	28.41	**28.41**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.25	16.35	0.00	0.00	16.35	33.25	**33.25**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	83.18	53.60	0.00	0.00	53.60	83.18	**83.18**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	137.62	72.47	0.00	0.00	72.47	137.62	**137.62**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	73.47	193.22	0.00	0.00	193.22	73.47	**73.47**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	74.11	73.72	0.39	0.20	0.00	0.15	73.92	74.50	**74.50**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	65.53	95.62	0.00	0.91	95.62	65.53	**65.53**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.65	110.05	0.00	0.00	110.05	68.65	**68.65**				
J-1	0.00	0.00	0.00	0.00	39.85	151.33	0.00	0.00	1.55	10.34	0.00	0.25	161.67	41.40	**41.40**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	25.78	177.22	24.33	157.27	17.25	1.29	334.49	50.11	**67.36**				
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.49	89.99	0.00	0.00	89.99	17.49	**17.49**	**Total Mitigation**	**Marsh**	Net marsh	Total Mitigation
K	0.00	0.00	0.00	0.00	0.00	0.00	88.51	413.42	0.00	0.00	0.00	0.20	413.42	88.51	**88.51**		**Created**		after marsh created
L	0.00	0.00	0.00	0.00	70.47	35.74	70.18	102.19	0.00	0.00	0.00	5.36	137.93	140.65	**140.65**		**with Constr$$**		with Constr$$
Total previous	235.18	525.95	561.97	63.46	395.87	637.85	585.06	869.98	533.87	862.50	31.31	52.05	2,433.79	2,076.77	2,108.08	2,869.21	**1,175.00**	933.08	1,694.21
Mitigation	$ 52,209,960	$ 58,380,450													$ 168,646,400	$ 279,236,810		$ 74,646,400	$ 185,236,810
Monitoring	$ 658,504	$ 1,472,660													$ 5,902,624	$ 8,033,788		$ 5,902,624	$ 8,033,788
LG	23.85	0.00	0.00	0.00	18.63	0.75	0.00	0.00	0.00	0.00	0.00	11.13	0.75	18.63	**18.63**	42.48			42.48
Mitigation	$ 5,294,700	$ -													$ 1,490,400	6,785,100.00			$ 6,785,100
Monitoring	$ 66,780	$ -													$ 52,164	118,944.00			$ 118,944
LL	171.06	35.66	85.56	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.11	85.56	**85.56**	292.28			292.28
Mitigation	$ 37,975,320	$ 3,958,260													$ 6,844,800	$ 48,778,380			$ 48,778,380
Monitoring	$ 478,968	$ 99,848													$ 239,568	$ 818,384			$ 818,384
TOTAL	430.09	561.61	647.53	63.57	414.50	638.60	585.06	869.98	533.87	862.50	31.31	66.02	2,434.65	2,180.96	**2,212.27**	3,203.97			2,028.97
Mitigation	$ 95,479,980	$ 62,338,710													$ 176,981,600	$ 334,800,290			$ 240,800,290
Monitoring	$ 1,204,252	$ 1,572,508													$ 6,194,356	$ 8,971,116			$ 8,971,116

High SLR Scenario - Construction Impacts Summary by Reach and Habitat Type

					INT	Tidal	BR	Tidal					Total	Total	Total				
	Fresh			Tidal Habitats	Habitats		Habitats		SAL	Tidal Habitats	Force Drained	(non-tidal)	Tidal	Tidal	Marsh				
	Hwds	Swamp	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water*	Marsh	Water	Water*	Marsh					
1% Levee Reach	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	(acres)	acres	acres	(acres)				
Barrier	201.87	547.48	208.32	48.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.40	208.32	**208.32**				
A	80.52	12.89	360.85	43.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.80	360.85	**360.85**				
B	0.00	0.00	143.28	19.54	38.61	150.96	0.00	0.00	0.00	0.00	0.00	38.95	170.50	181.89	**181.89**				
E-1	0.00	0.00	0.00	0.00	93.55	191.36	0.00	0.00	0.00	0.00	0.00	0.00	191.36	93.55	**93.55**				
E-2	0.00	0.00	0.00	0.00	38.68	215.81	0.00	0.00	0.00	0.00	0.00	4.16	215.81	38.68	**38.68**				
F-1	0.00	0.00	0.00	0.00	83.32	16.59	274.98	78.87	0.00	0.00	0.00	0.00	95.46	358.30	**358.30**				
F-2	0.00	0.00	0.00	0.00	146.19	42.10	0.00	0.00	0.00	0.00	0.00	0.00	42.10	146.19	**146.19**				
G-1	0.00	0.00	0.00	0.00	0.00	0.00	138.16	41.26	0.00	0.00	26.39	0.00	41.26	138.16	**164.55**				
G-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.44	96.12	0.00	0.00	96.12	52.44	**52.44**				
G-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.72	28.96	0.00	0.00	28.96	42.72	**42.72**				
H-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	111.75	79.37	0.00	0.00	79.37	111.75	**111.75**				
H-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	185.91	107.04	0.00	0.00	107.04	185.91	**185.91**				
H-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	102.13	119.78	0.00	0.00	119.78	102.13	**102.13**				
I-1	0.00	0.00	0.00	0.00	0.00	0.00	82.35	100.82	0.41	0.22	0.00	0.15	101.04	82.76	**82.76**				
I-2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85.71	139.75	0.00	0.91	139.75	85.71	**85.71**				
I-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	89.97	144.24	0.00	0.00	144.24	89.97	**89.97**				
J-1	0.00	0.00	0.00	0.00	79.02	216.72	0.00	0.00	1.95	12.78	2.36	0.76	229.50	80.97	**83.33**				
J-2	0.00	0.00	0.00	0.00	0.00	0.00	40.26	299.80	34.26	200.29	28.28	2.04	500.09	74.52	**102.80**				
J-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.36	123.37	0.00	4.34	123.37	25.36	**25.36**	**Total Mitigation**	**Marsh**	Net marsh	Total Mitigation
K	0.00	0.00	0.00	0.00	0.00	0.00	138.47	552.51	0.00	0.00	0.00	0.37	552.51	138.47	**138.47**		**Created**		after marsh created
L	0.00	0.00	0.00	0.00	105.09	69.91	106.43	128.01	0.00	0.00	0.00	6.84	197.92	211.52	**211.52**		**with Constr$$**		with Constr$$
Total previous	282.39	560.37	712.45	111.74	584.46	903.45	780.65	1,201.27	732.61	1,051.92	57.03	58.52	3,268.38	2,810.17	2,867.20	3,709.96	**1,175.00**	1,692.20	2,534.96
Mitigation	$ 62,690,580	$ 62,201,070													$ 229,376,000	$ 354,267,650		$ 135,376,000	$ 260,267,650
Monitoring	$ 790,692	$ 1,569,036													$ 8,028,160	$ 10,387,888		$ 8,028,160	$ 10,387,888
LG	50.95	0.00	0.00	0.00	29.61	1.19	0.00	0.00	0.00	0.00	0.00	18.39	1.19	29.61	**29.61**	80.56			80.56
Mitigation	$ 11,310,900	$ -													$ 2,368,800	13,679,700.00			$ 13,679,700
Monitoring	$ 142,660	$ -													$ 82,908	225,568.00			$ 225,568
LL	186.92	38.92	88.60	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.84	0.12	88.60	**88.60**	314.44			314.44
Mitigation	$ 41,496,240	$ 4,320,120													$ 7,088,000	$ 52,904,360			$ 52,904,360
Monitoring	$ 523,376	$ 108,976													$ 248,080	$ 880,432			$ 880,432
TOTAL	520.26	599.29	801.05	111.86	614.07	904.64	780.65	1,201.27	732.61	1,051.92	57.03	79.75	3,269.69	2,928.38	**2,985.41**	4,104.96			2,929.96
Mitigation	$ 115,497,720	$ 66,521,190													$ 238,832,800	$ 420,851,710			$ 326,851,710
Monitoring	$ 1,456,728	$ 1,678,012													$ 8,359,148	$ 11,493,888			$ 11,493,888

	Low SLR	Medium SLR	High SLR
B5	2.691	-6.326	-0.169
B4	-139.248	13.575	9.293
B3	1.495	-0.292	-0.249
B1, B2	9.983	-36.465	-29.914
C20 100 Year	1.238	-7.068	-14.780
Bayou Dulac	-0.817	-64.014	-94.552
Robin Canal	0.314	-77.745	-112.631
C8	0.219	-3.029	-4.463
C5-C7, C9	0.390	-24.197	-25.502
C1-C4	4.379	-10.135	-14.122
Total AAHUs	-119.355	-215.694	-287.087

Summary of Morganza Indirect Impacts for Constructable Features ONLY

	Best Case Scenario AAHUs		Worse Case Scenario AAHUs	
	Med SLR	High SLR	Med SLR	High SLR
March 2013 Operation Plan "plan as is"	-216	-287	-577	-331
March 2013 Operation Plan with "foreseeable future change"	-375	-380	-750	-430

Notes

Medium SLR Scenario **Medium SLR Scenario**

			2015	2016	2085		2016	2020	2039	2062	2085	
			FWOP TY0	FWOP TY1	FWOP TY70		FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70	
B5	**INT**	V1	66	66	43		66	65			43	
		V2	12	12	5		12	14			5	
		V3-1	35	35	0		35	32			0	
		V3-2	36	36	30		36	38			30	
		V3-3	0	0	11		0	1			11	
		V3-4	29	29	59		29	29			59	
		V3-5	0	0	0		0	0			0	
		V4	10	10	7		10	10			7	
		V5										
		V5	4.1	4.1	6.1		4.1	3.9			6.2	
		V6										
		V6	0.990	0.990	0.990		0.990	0.781			0.577	
		TOT Ac	1,008	1,008	1,008		1,008	1,008			0	
		% FM	0	0	0		0	0			0	
		% INT	100	100	100		100	100			0	

			2015	2016	2085		2016	2020	2039	2062	2085	
			FWOP TY0	FWOP TY1	FWOP TY70		FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70	
B4	**INT**	V1	50	49	24		49	48			24	
		V2	6	6	2		6	8			3	
		V3-1	0	0	0		0	0			0	
		V3-2	24	23	0		23	22			0	
		V3-3	50	50	0		50	49			0	
		V3-4	26	27	100		27	29			100	
		V3-5	0	0	0		0	0			0	
		V4	5	5	1		5	4			1	
		V5						0				
		V5	3.4	3.4	4.5		3.4	3.1			4.2	
		V6										
		V6	0.246	0.246	0.246		0.246	0.203			0.162	
		TOT Ac	4,141	4,141	4,141		4,141	4,141	4,141	4,141	4,141	
		% FM	0	0	0		0	0	0	0	0	
		% INT	100	100	100		100	100	100	100	100	

			2015	2016	2077	2085	2016	2020	2039	2062	2077	2085
			FWOP TY0	FWOP TY1	FWOP TY62	FWOP TY70	FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY62	FWP TY70
B3	**INT**	V1	50	49	0	0	49	46			0	0
		V2	8	8	0	0	8	10			0	0
		V3-1	30	30	0	0	30	23			0	0
		V3-2	10	9	0	0	9	11			0	0
		V3-3	0	0	0	0	0	2			0	0
		V3-4	60	61	0	0	61	64			0	0
0 acres	2077	V3-5	0	0	100	100	0	0			100	100
	TY62	V4	6	6	0	0	6	5			0	0
		V5										
		V5	2.9	3.0	3.9	4.0	3.0	2.8			3.9	4.0
		V6										
		V6	0.980	0.980	0.980	0.980	0.980	0.797			0.683	0.618
		TOT Ac	570	570	570	570	570	570	570	570	570	570
		% FM	0	0	0	0	0	0	0	0	0	0
		% INT	100	100	100	100	100	100	100	100	100	100

HIGH SLR Scenario **HIGH SLR Scenario**

					2015	2016	2058	2068	2085	2016	2020	2058	2068	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY43	FWOP TY53	FWOP TY70	FWP TY1	FWP TY5	FWP TY43	FWP TY53	FWP TY70
B5	**INT**	**B5**	**INT**	V1	66	66	40	0	0	66	65	40	0	0
				V2	12	12	5	0	0	12	14	6	0	0
				V3-1	35	35	0	0	0	35	32	0	0	0
				V3-2	36	36	0	0	0	36	38	22	0	0
				V3-3	0	0	0	0	0	0	1	16	0	0
			0	V3-4	29	29	100	0	0	29	29	62	0	0
			high SLR	V3-5	0	0	0	100	100	0	0	0	100	100
				V4	10	10	7	0	0	10	10	7	0	0
				V5										
				V5	4.1	4.2	6.6	7.2	8.2	4.2	4.0	5.6	5.9	7.0
				V6										
				V6	0.990	0.990	0.990	0.990	0.990	0.990	0.778	0.371	0.190	0.190
				TOT Ac	1,008	1,008	1,008	0	1,008	1,008	1,008	1,008	1,008	0
				% FM	0	0	0	0	0	0	0	0	0	0
				% INT	100	100	100	0	100	100	100	100	100	0

					2015	2016	2058	2068	2085	2016	2020	2058	2068	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY43	FWOP TY53	FWOP TY70	FWP TY1	FWP TY5	FWP TY43	FWP TY53	FWP TY70
B4	**INT**	**B4**	**INT**	V1	50	49	25	0	0	49	48	25	0	0
			0	V2	6	6	1	0	0	6	8	2	0	0
				V3-1	0	0	0	0	0	0	0	0	0	0
				V3-2	24	23	0	0	0	23	22	0	0	0
				V3-3	50	50	0	0	0	50	49	0	0	0
			0	V3-4	26	27	100	0	0	27	29	0	0	0
0 acres	2083		high SLR	V3-5	0	0	0	100	100	0	0	100	100	100
	TY68			V4	5	5	1	0	0	5	4	1	0	0
				V5										
				V5	3.4	3.4	5.1	5.5	6.2	3.4	3.2	4.5	4.8	5.5
				V6										
		0.385		V6	0.246	0.246	0.246	0.246	0.246	0.246	0.203	0.120	0.083	0.083
				TOT Ac	4,141	4,141	4,141	0	4,141	4,141	4,141	4,141	0	0
				% FM	0	0	0	0	0	0	0	0	0	0
				% INT	100	100	100	0	100	100	100	100	0	0

					2015	2016	2061	2085	2016	2020	2061	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY46	FWOP TY70	FWP TY1	FWP TY5	FWP TY46	FWP TY70
B3	**INT**	**B3**	**INT**	V1	50	49	0	0	49	46	0	0
			0	V2	8	8	0	0	8	9	0	0
				V3-1	30	30	0	0	30	23	0	0
				V3-2	10	9	0	0	9	11	0	0
				V3-3	0	0	0	0	0	2	0	0
			0	V3-4	60	61	0	0	61	64	0	0
0 acres	2061		high SLR	V3-5	0	0	100	100	0	0	100	100
	TY46			V4	6	6	0	0	6	5	0	0
				V5								
				V5	2.9	3.1	4.9	6.0	3.1	3.0	4.4	5.2
				V6								
				V6	0.980	0.980	0.980	0.980	0.980	0.794	0.436	0.280
				TOT Ac	570	570	570	0	570	570	570	570
				% FM	0	0	0	0	0	0	0	0
				% INT	100	100	100	0	100	100	100	100

		2015	2016	2085		2016	2020	2039	2062	2085
		FWOP TY0	FWOP TY1	FWOP TY70		FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70
B1,B2 FM	V1	90	90	76		90	90			76
	V2	24	24	21		24	25			21
	V3-1	95	95	47		95	95			47
	V3-2	5	5	29		5	5			29
	V3-3	0	0	24		0	0			24
	V3-4	0	0	0		0	0			0
	V3-5	0	0	0		0	0			0
	V4	35	35	25		35	35			25
	V5	1.7	1.7	2.2		1.7	1.6			2.3
	V5									
	V6	0.986	0.986	0.986		0.986	0.804			0.625
	V6									
	TOT Ac	3,965	3,965	3,965		3,965	3,965	3,965	3,965	3,965
	% FM	100	100	100		100	100	100	100	100
	% INT	0	0	0		0	0	0	0	0

		2015	2016	2085		2016	2020	2039	2062	2085
		FWOP TY0	FWOP TY1	FWOP TY70		FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70
C20 BR	V1	54	54	15		54	52			15
35 Yr	V2	6	6	0		6	7			0
	V3-1	0	0	0		0	0			0
	V3-2	58	58	0		58	54			0
	V3-3	0	0	0		0	0			0
	V3-4	42	42	100		42	46			100
	V3-5	0	0	0		0	0			0
	V4	11	11	0		11	10			0
	V5									
	V5	5.4	5.4	7.5		5.4	5.1			8.1
	V6									
	V6	0.990	0.990	0.990		0.990	0.596			0.456
	TOT Ac	462	462	462		462	462	462	462	462

		2015	2016	2085		2016	2020	2039	2062	2085
		FWOP TY0	FWOP TY1	FWOP TY70		FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70
C20 BR	V1	56	55	15		55	53			15
100 yr	V2	6	6	0		6	7			0
	V3-1	0	0	0		0	0			0
	V3-2	60	57	0		57	53			0
	V3-3	4	6	0		6	6			0
	V3-4	36	37	100		37	41			100
	V3-5	0	0	0		0	0			0
	V4	11	11	1		11	10			1
	V5									
	V5	5.4	5.4	7.5		5.4	5.1			8.1
	V6									
	V6	0.990	0.990	0.990	0.000	0.990	0.596			0.456
	TOT Ac	439	439	439		439	439	439	439	439

		2015	2016	2071	2085	2016	2020	2039	2062	2071	2085
		FWOP TY0	FWOP TY1	FWOP TY56	FWOP TY70	FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY56	FWP TY70
Bayou SAL	V1	28	28	0	0	28	26			0	0
Dulac	V2	5	5	0	0	5	5			0	0
	V3-1	0	0	0	0	0	0			0	0
	V3-2	0	0	0	0	0	0			0	0
	V3-3	12	12	0	0	12	4			0	0
	V3-4	88	88	0	0	88	96			0	0
	V3-5	0	0	100	100	0	0			100	100
0 acres 2071	V4	6	5	0	0	5	5			0	0
TY56	V5										
	V5	8.4	8.4	9.4	9.6	8.4	8.3			9.5	9.7
	V6										
	V6	0.980	0.980	0.980	0.980	0.980	0.815			0.733	0.670
	TOT Ac	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865

				2015	2016	2058	2068	2085	2016	2020	2058	2068	2085
	Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY43	FWOP TY53	FWOP TY70	FWP TY1	FWP TY5	FWP TY43	FWP TY53	FWP TY70
B1,B2 FM	**B1,B2**	**FM**	V1	90	90	67	0	0	90	89	67	0	0
		0	V2	24	24	17	0	0	24	24	17	0	0
			V3-1	95	95	6	0	0	95	94	6	0	0
			V3-2	5	5	54	0	0	5	6	54	0	0
			V3-3	0	0	40	0	0	0	0	40	0	0
		0	V3-4	0	0	0	0	0	0	0	0	0	0
		high SLR	V3-5	0	0	0	100	100	0	0	0	100	100
			V4	35	35	18	0	0	35	35	18	0	0
			V5	1.7	1.7	2.8	3.0	3.4	1.7	1.7	2.5	2.6	3.1
			V5										
			V6	0.986	0.986	0.986	0.986	0.986	0.986	0.801	0.445	0.286	0.286
			V6										
			TOT Ac	3,965	3,965	3,965	0	3,965	3,965	3,965	3,965	3,965	0
			% FM	100	100	100	0	100	100	100	100	100	0
			% INT	0	0	0	0	0	0	0	0	0	0

				2015	2016	2048	2058	2085	2016	2020	2048	2058	2085
	Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY33	FWOP TY43	FWOP TY70	FWP TY1	FWP TY5	FWP TY33	FWP TY43	FWP TY70
C20 BR	**C20**	**BR**	V1	54	54	30	0	0	54	52	30	0	0
35 Yr		**0**	V2	6	6	1	0	0	6	7	2	0	0
			V3-1	0	0	0	0	0	0	0	0	0	0
			V3-2	58	58	0	0	0	58	54	0	0	0
			V3-3	0	0	19	0	0	0	0	19	0	0
		0	V3-4	42	42	81	0	0	42	46	81	0	0
		high SLR	V3-5	0	0	0	100	100	0	0	0	100	100
0 acres 2074			V4	11	11	1	0	0	11	10	1	0	0
TY59			V5										
			V5	5.4	5.5	7.2	7.7	9.1	5.5	5.2	6.8	6.9	8.3
			V6										
			V6	0.990	0.990	0.990	0.990	0.990	0.990	0.594	0.525	0.314	0.190
			TOT Ac	462	462	462	462	462	462	462	462	462	462

				2015	2016	2048	2058	2085	2016	2020	2048	2058	2085
	Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY33	FWOP TY43	FWOP TY70	FWP TY1	FWP TY5	FWP TY33	FWP TY43	FWP TY70
C20 BR	**C20**	**BR**	V1	56	55	31	0	0	55	53	31	0	0
100 yr		**0**	V2	6	6	1	0	0	6	7	2	0	0
			V3-1	0	0	0	0	0	0	0	0	0	0
			V3-2	60	57	0	0	0	57	53	0	0	0
			V3-3	4	6	24	0	0	6	6	24	0	0
		0	V3-4	36	37	76	0	0	37	41	76	0	0
		high SLR	V3-5	0	0	0	100	100	0	0	0	0	100
0 acres 2074			V4	11	11	5	0	0	11	11	2	0	0
TY59			V5										
			V5	5.4	5.5	7.2	7.7	9.1	5.5	5.2	6.8	6.9	8.3
			V6										
			V6	0.990	0.990	0.990	0.990	0.990	0.990	0.594	0.525	0.314	0.190
			TOT Ac	439	439	439	439	439	439	439	439	439	439

				2015	2016	2045	2055	2085	2016	2020	2045	2055	2085
	Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY30	FWOP TY40	FWOP TY70	FWP TY1	FWP TY5	FWP TY30	FWP TY40	FWP TY70
Bayou SAL	**Bayou**	**SAL**	V1	28	28	10	0	0	28	26	10	0	0
Dulac		**0**	V2	5	5	0	0	0	5	5	0	0	0
			V3-1	0	0	0	0	0	0	0	0	0	0
			V3-2	0	0	0	0	0	0	0	0	0	0
			V3-3	12	12	0	0	0	12	4	0	0	0
		0	V3-4	88	88	0	0	0	88	96	0	0	0
		high SLR	V3-5	0	0	100	100	100	0	0	100	100	100
0 acres 2057			V4	6	5	0	0	0	5	5	0	0	0
TY42			V5										
			V5	8.4	8.4	9.7	10.1	11.4	8.4	8.3	9.2	9.5	10.2
			V6										
			V6	0.980	0.980	0.980	0.980	0.980	0.980	0.813	0.751	0.676	0.410
			TOT Ac	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865	3,865

			2015	2016	2025	2085	2016	2020	2025	2039	2062	2085
			FWOP TY0	FWOP TY1	FWOP TY10	FWOP TY70	FWP TY1	FWP TY5	FWP TY10	FWP TY24	FWP TY47	FWP TY70
Robin	**SAL**	V1	8	7	0	0	7	4	0			0
Canal		V2	0	0	0	0	0	0	0			0
		V3-1	0	0	0	0	0	0	0			0
		V3-2	0	0	0	0	0	0	0			0
		V3-3	0	0	0	0	0	0	0			0
		V3-4	100	100	0	0	100	100	0			0
		V3-5	0	0	100	100	0	0	100			100
0 acres	2025	V4	1	1	0	0	1	0	0			0
	TY10	V5										
		V5	12.0	12.0	12.2	13.2	12.0	11.8	12.0			13.2
		V6										
		V6	0.960	0.960	0.960	0.960	0.960	0.891	0.878			0.831
		TOT Ac	9,923	9,923	9,923	9,923	9,923	9,923	9,923	9,923	9,923	9,923

					2015	2016	2025	2085	2016	2020	2025	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY10	FWOP TY70	FWP TY1	FWP TY5	FWP TY10	FWP TY70
Robin	**SAL**	**Robin**	**SAL**	V1	8	7	0	0	7	4	0	0
Canal			**0**	V2	0	0	0	0	0	0	0	0
				V3-1	0	0	0	0	0	0	0	0
				V3-2	0	0	0	0	0	0	0	0
				V3-3	0	0	0	0	0	0	0	0
			0	V3-4	100	100	0	0	100	100	0	0
			high SLR	V3-5	0	0	100	100	0	0	100	100
0 acres	2025			V4	1	1	0	0	1	0	0	0
	TY10			V5								
				V5	12.0	12.0	12.6	16.2	12.0	11.9	12.2	14.7
				V6								
				V6	0.960	0.960	0.960	0.960	0.960	0.890	0.888	0.723
				TOT Ac	9,923	9,923	9,923	9,923	9,923	9,923	9,923	9,923

			2015	2016	2036	2085	2016	2020	2036	2039	2062	2085
			FWOP TY0	FWOP TY1	FWOP TY21	FWOP TY70	FWP TY1	FWP TY5	FWP TY21	FWP TY24	FWP TY47	FWP TY70
C8	**BR**	V1	20	19	0	0	19	15	0			0
		V2	3	3	0	0	3	3	0			0
		V3-1	0	0	0	0	0	0	0			0
		V3-2	0	0	0	0	0	0	0			0
		V3-3	0	0	0	0	0	0	0			0
		V3-4	100	100	0	0	100	100	0			0
		V3-5	0	0	100	100	0	0	100			100
0 acres	2036	V4	5	4	0	0	4	3	0			0
	TY21	V5										
		V5	8.8	8.8	9.0	9.6	8.8	8.7	9.0			9.6
		V6										
		V6	0.860	0.860	0.860	0.860	0.860	0.819	0.816			0.783
		TOT Ac	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196

					2015	2016	2034	2085	2016	2020	2034	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY19	FWOP TY70	FWP TY1	FWP TY5	FWP TY19	FWP TY70
C8	**BR**	**C8**	**BR**	V1	20	19	0	0	19	15	0	0
			0	V2	3	3	0	0	3	3	0	0
				V3-1	0	0	0	0	0	0	0	0
				V3-2	0	0	0	0	0	0	0	0
				V3-3	0	0	0	0	0	0	0	0
			0	V3-4	100	100	0	0	100	100	0	0
			high SLR	V3-5	0	0	100	100	0	0	100	100
0 acres	2034			V4	5	4	0	0	4	3	0	0
	TY19			V5								
				V5	8.8	8.8	9.3	10.8	8.8	8.8	9.3	10.8
				V6								
				V6	0.860	0.860	0.860	0.860	0.860	0.818	0.813	0.718
				TOT Ac	3,196	3,196	3,196	3,196	3,196	3,196	3,196	3,196

			2015	2016	2062	2085	2016	2020	2039	2062	2085
			FWOP TY0	FWOP TY1	FWOP TY47	FWOP TY70	FWP TY1	FWP TY5	FWP TY24	FWP TY47	FWP TY70
C5-C7	**BR**	V1	40	39	0	0	39	36		0	0
C9		V2	10	10	0	0	10	11		0	0
		V3-1	0	0	0	0	0	0		0	0
		V3-2	0	0	0	0	0	0		0	0
		V3-3	60	56	0	0	56	44		0	0
		V3-4	40	44	0	0	44	56		0	0
		V3-5	0	0	100	100	0	0		100	100
0 acres	2062	V4	6	6	0	0	6	5		0	0
	TY47	V5									
		V5	8.0	8.0	8.5	8.8	8.0	7.9		8.6	8.9
		V6									
		V6	0.870	0.870	0.870	0.870	0.870	0.801		0.780	0.741
		TOT Ac	8,807	8,807	8,807	8,807	8,807	8,807	8,807	8,807	8,807

					2015	2016	2052	2085	2016	2020	2052	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY37	FWOP TY70	FWP TY1	FWP TY5	FWP TY37	FWP TY70
C5-C7	**BR**	**C5-C7**	**BR**	V1	40	39	0	0	39	35	0	0
C9			**0**	V2	10	10	0	0	10	8	0	0
				V3-1	0	0	0	0	0	0	0	0
				V3-2	0	0	0	0	0	0	0	0
				V3-3	60	56	0	0	56	40	0	0
			0	V3-4	40	44	0	0	44	60	0	0
			high SLR	V3-5	0	0	100	100	0	0	100	100
0 acres	2052			V4	6	6	0	0	6	5	0	0
	TY37			V5								
				V5	8.0	8.0	9.2	10.3	8.0	8.0	9.0	9.8
				V6								
				V6	0.870	0.870	0.870	0.870	0.870	0.800	0.755	0.633
				TOT Ac	8,807	8,807	8,807	8,807	8,807	8,807	8,807	8,807

			2015	2016	2057	2085	2016	2020	2039	2057	2062	2085
			FWOP TY0	FWOP TY1	FWOP TY42	FWOP TY70	FWP TY1	FWP TY5	FWP TY24	FWP TY42	FWP TY47	FWP TY70
C1-	**INT**	V1	30	29	0	0	29	27		0		0
C4		V2	12	12	0	0	12	10		0		0
		V3-1	0	0	0	0	0	0		0		0
		V3-2	0	0	0	0	0	0		0		0
		V3-3	20	16	0	0	16	8		0		0
		V3-4	80	84	0	0	84	92		0		0
		V3-5	0	0	100	100	0	0		100		100
0 acres	2057	V4	5	5	0	0	5	4		0		0
	TY42	V5										
		V5	7.1	7.1	7.3	7.4	7.1	7.0		7.2		7.4
		V6										
		V6	0.870	0.870	0.870	0.870	0.870	0.801		0.786		0.741
		TOT Ac	10,301	10,301	10,301	10,301	10,301	10,301	10,301	10,301	10,301	10,301
		% FM	0	0	0	0	0	0	0	0	0	0
		% INT	100	100	100	100	100	100	100	100	100	100

					2015	2016	2049	2085	2016	2020	2049	2085
		Reach	**Polygon**		FWOP TY0	FWOP TY1	FWOP TY34	FWOP TY70	FWP TY1	FWP TY5	FWP TY34	FWP TY70
C1-	**INT**	**C1-**	**INT**	V1	30	29	0	0	29	26	0	0
C4			**0**	V2	12	12	0	0	12	10	0	0
				V3-1	0	0	0	0	0	0	0	0
				V3-2	0	0	0	0	0	0	0	0
				V3-3	20	16	0	0	16	8	0	0
			0	V3-4	80	84	0	0	84	92	0	0
			high SLR	V3-5	0	0	100	100	0	0	100	100
0 acres	2049			V4	5	5	0	0	5	4	0	0
	TY34			V5								
				V5	7.1	7.1	7.7	8.3	7.1	7.1	7.7	8.2
				V6								
				V6	0.870	0.870	0.870	0.870	0.870	0.800	0.766	0.633
				TOT Ac	10,301	10,301	10,301	10,301	10,301	10,301	10,301	0
				% FM	0	0	0	0	0	0	0	0
				% INT	100	100	100	100	100	100	100	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B5 Low SLR**

Project Area:	1,008
% Fresh	0
% Intermediate	100

Condition: Future Without Project

		TY	0	TY	1	TY	70
Variable		Value	SI	Value	SI	Value	SI
V1	% Emergent	66	0.69	66	0.69	53	0.58
V2	% Aquatic	12	0.21	12	0.21	10	0.19
V3	Interspersion	%		%		%	
	Class 1	35	0.62	35	0.62	10	0.45
	Class 2	36		36		37	
	Class 3	0		0		13	
	Class 4	29		29		40	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	10	0.21	8	0.19
V5	Salinity (ppt)						
	fresh	0	0.68	0	1.00	0	1.00
	intermediate	4.1		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		**0.58**	**EM HSI =**	**0.62**	**EM HSI =**	**0.54**
	Open Water HSI =		**0.27**	**OW HSI =**	**0.30**	**OW HSI =**	**0.27**

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B5 Low SLR**

FWOP

		TY		TY		TY	
Variable		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B5 Low SLR**

FWOP

		TY		TY		TY	
Variable		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B5 Low SLR**

Condition: Future With Project

Project Area:	1,008
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	66	0.69	66	0.69	65	0.69
V2	% Aquatic	12	0.21	17	0.25	17	0.25
V3	Interspersion	%		%		%	
	Class 1	35	0.62	35	0.62	32	0.61
	Class 2	36		36		38	
	Class 3	0		0		1	
	Class 4	29		29		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	10	0.21	10	0.21
V5	Salinity (ppt)						
	fresh	0	0.68	0	1.00	0	1.00
	intermediate	4.1		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		**0.58**	**EM HSI =**	**0.62**	**EM HSI =**	**0.61**
	Open Water HSI =		**0.27**	**OW HSI =**	**0.32**	**OW HSI =**	**0.32**

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B5 Low SLR**

FWP

Variable		TY	24	TY	47	TY	70
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	62	0.66	57	0.61	53	0.58
V2	% Aquatic	17	0.25	16	0.24	15	0.24
V3	Interspersion	%		%		%	
	Class 1	28	0.57	20	0.51	10	0.45
	Class 2	36		37		37	
	Class 3	3		3		13	
	Class 4	33		40		40	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	9	0.20	8	0.19
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	**0.59**	**EM HSI =**	**0.56**	**EM HSI =**	**0.54**
		OW HSI =	**0.32**	**OW HSI =**	**0.31**	**OW HSI =**	**0.30**

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B5 Low SLR**

FWP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B5 Low SLR**

Future Without Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	665	0.58	388.08	
1	665	0.62	411.73	399.90
70	534	0.54	287.13	23987.66
Max=	70		AAHUs =	348.39

Future With Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	665	0.58	388.08	
1	665	0.62	411.73	399.90
5	655	0.61	401.41	1626.22
70	534	0.54	287.13	22278.79
Max=	70		AAHUs	347.21

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	347.21
B. Future Without Project Emergent Marsh AAHUs =	348.39
Net Change (FWP - FWOP) =	-1.18

AAHU CALCULATION - OPEN WATER

Project: **B5 Low SLR**

Future Without Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	343	0.27	93.48	
1	343	0.30	101.61	97.54
70	474	0.27	128.67	7982.06
Max=	70		AAHUs =	115.42

Future With Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	343	0.27	93.48	
1	343	0.32	110.30	101.89
5	353	0.32	113.15	446.92
70	474	0.30	140.94	8288.32
Max=	70		AAHUs	126.24

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	126.24
B. Future Without Project Open Water AAHUs =	115.42
Net Change (FWP - FWOP) =	10.82

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-1.18
B. Open Water Habitat Net AAHUs =	10.82
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	2.69

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B5 Medium SLR**

Condition: Future Without Project

Project Area:	1,008
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	66	0.69	66	0.69	43	0.49
V2	% Aquatic	12	0.21	12	0.21	5	0.15
V3	Interspersion	%		%		%	
	Class 1	35	0.62	35	0.62	0	0.34
	Class 2	36		36		30	
	Class 3	0		0		11	
	Class 4	29		29		59	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	10	0.21	7	0.18
V5	Salinity (ppt)						
	fresh	0	0.68	0	0.68	0	0.28
	intermediate	4.1		4.1		6.1	
V6	Access Value						
	fresh	0.0000	0.99	0.0000	0.99	0.0000	0.99
	intermediate	0.9900		0.9900		0.9900	
	Emergent Marsh HSI =		0.72	**EM HSI =**	0.72	**EM HSI =**	0.50
	Open Water HSI =		0.35	**OW HSI =**	0.35	**OW HSI =**	0.24

Intermediate Calculations		
Interspersion		
1	1	0
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	0.68	0.28
Access Value		
0.30	0.30	0.30
0.99	0.99	0.99

Project: **B5 Medium SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B5 Medium SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B5 Medium SLR**

Condition: Future With Project

Project Area:	1,008
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	66	0.69	66	0.69	65	0.69
V2	% Aquatic	12	0.21	12	0.21	14	0.23
V3	Interspersion	%		%		%	
	Class 1	35	0.62	35	0.62	32	0.61
	Class 2	36		36		38	
	Class 3	0		0		1	
	Class 4	29		29		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	10	0.21	10	0.21
V5	Salinity (ppt)						
	fresh	0	0.68	0	0.68	0	0.72
	intermediate	4.1		4.1		3.9	
V6	Access Value						
	fresh	0.0000	0.99	0.0000	0.99	0.0000	0.82
	intermediate	0.99		0.9900		0.7810	
	Emergent Marsh HSI =		0.72	EM HSI =	0.72	EM HSI =	0.70
	Open Water HSI =		0.35	OW HSI =	0.35	OW HSI =	0.36

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	0.68	0.72
Access Value		
0.30	0.30	0.30
0.99	0.99	0.82

Project: **B5 Medium SLR**

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	43	0.49
V2	% Aquatic	0	0.10	0	0.10	5	0.15
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.34
	Class 2	0		0		30	
	Class 3	0		0		11	
	Class 4	0		0		59	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	7	0.18
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	0.26
	intermediate	0		0		6.2	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.66
	intermediate	0.0000		0.0000		0.5770	
		EM HSI =		EM HSI =		EM HSI =	0.47
		OW HSI =		OW HSI =		OW HSI =	0.22

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0.6
0	0	0.4
0	0	0.2
0	0	0
Salinity		
1.00	1.00	1.00
1.00	1.00	0.26
Access Value		
0.30	0.30	0.30
0.20	0.20	0.66

Project: **B5 Medium SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: B5 Medium SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	665	0.72	477.33	
1	665	0.72	477.33	477.33
70	433	0.50	214.58	23278.00
Max=	70		AAHUs =	339.36

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	665	0.72	477.33	
1	665	0.72	477.33	477.33
5	655	0.70	456.73	1867.98
70	433	0.47	201.57	20837.33
Max=	70		AAHUs	331.18

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	331.18
B. Future Without Project Emergent Marsh AAHUs =	339.36
Net Change (FWP - FWOP) =	-8.18

AAHU CALCULATION - OPEN WATER

Project: B5 Medium SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	343	0.35	120.53	
1	343	0.35	120.53	120.53
70	575	0.24	138.98	9245.93
Max=	70		AAHUs =	133.81

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	343	0.35	120.53	
1	343	0.35	120.53	120.53
5	353	0.36	126.10	493.22
70	575	0.22	128.03	8582.71
Max=	70		AAHUs	131.38

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	131.38
B. Future Without Project Open Water AAHUs =	133.81
Net Change (FWP - FWOP) =	-2.43

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-8.18
B. Open Water Habitat Net AAHUs =	-2.43
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-6.33

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

B5 High SLR

Project Area:	1,008
% Fresh	0
% Intermediate	100

Future Without Project

	TY	0	TY	1	TY	43
	Value	SI	Value	SI	Value	SI
% Emergent	66	0.69	66	0.69	40	0.46
% Aquatic	12	0.21	12	0.21	5	0.15
Interspersion	%		%		%	
Class 1	35	0.62	35	0.62	0	0.20
Class 2	36		36		0	
Class 3	0		0		0	
Class 4	29		29		100	
Class 5	0		0		0	
%OW <= 1.5ft	10	0.21	10	0.21	7	0.18
Salinity (ppt)						
fresh	0	0.68	0	0.66	0	0.18
intermediate	4.1		4.2		6.6	
Access Value						
fresh	0.0000	0.99	0.0000	0.99	0.0000	0.99
intermediate	0.9900		0.9900		0.9900	
Emergent Marsh HSI =		0.72	**EM HSI =**	0.72	**EM HSI =**	0.45
Open Water HSI =		0.35	**OW HSI =**	0.35	**OW HSI =**	0.22

Intermediate Calculations		
Interspersion		
1	1	0
0.6	0.6	0
0	0	0
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	0.66	0.18
Access Value		
0.30	0.30	0.30
0.99	0.99	0.99

B5 High SLR

	TY	53	TY	70	TY	
	Value	SI	Value	SI	Value	SI
% Emergent	0	0.10	0	0.10		
% Aquatic	0	0.10	0	0.10		
Interspersion	%		%		%	
Class 1	0	0.10	0	0.10		
Class 2	0		0			
Class 3	0		0			
Class 4	0		0			
Class 5	100		100			
%OW <= 1.5ft	0	0.10	0	0.10		
Salinity (ppt)						
fresh	0	0.10	0	0.10		
intermediate	7.2		8.2			
Access Value						
fresh	0.0000	0.99	0.0000	0.99		
intermediate	0.9900		0.9900			
	EM HSI =	0.14	**EM HSI =**	0.14	**EM HSI =**	
	OW HSI =	0.16	**OW HSI =**	0.16	**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0
Salinity		
1.00	1.00	
0.10	0.10	
Access Value		
0.30	0.30	
0.99	0.99	

B5 High SLR

	TY		TY		TY	
	Value	SI	Value	SI	Value	SI
% Emergent						
% Aquatic						
Interspersion	%		%		%	
Class 1						
Class 2						
Class 3						
Class 4						
Class 5						
%OW <= 1.5ft						
Salinity (ppt)						
fresh						
intermediate						
Access Value						
fresh						
intermediate						
	EM HSI =		**EM HSI =**		**EM HSI =**	
	OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B5 High SLR**

Condition: Future With Project

Project Area:	1,008
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	66	0.69	66	0.69	65	0.69
V2	% Aquatic	12	0.21	12	0.21	14	0.23
V3	Interspersion	%		%		%	
	Class 1	35	0.62	35	0.62	32	0.61
	Class 2	36		36		38	
	Class 3	0		0		1	
	Class 4	29		29		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	10	0.21	10	0.21	10	0.21
V5	Salinity (ppt)						
	fresh	0	0.68	0	0.66	0	0.70
	intermediate	4.1		4.2		4	
V6	Access Value						
	fresh	0.0000	0.99	0.0000	0.99	0.0000	0.82
	intermediate	0.99		0.9900		0.7780	
	Emergent Marsh HSI =		0.72	EM HSI =	0.72	EM HSI =	0.69
	Open Water HSI =		0.35	OW HSI =	0.35	OW HSI =	0.36

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.68	0.66	0.70
Access Value		
0.30	0.30	0.30
0.99	0.99	0.82

Project: **B5 High SLR**

FWP

Variable		TY	43	TY	53	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	0	0.10	0	0.10
V2	% Aquatic	6	0.15	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.10	0	0.10
	Class 2	22		0		0	
	Class 3	16		0		0	
	Class 4	62		0		0	
	Class 5	0		100		100	
V4	%OW <= 1.5ft	7	0.18	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.38	0	0.32	0	0.10
	intermediate	5.6		5.9		7	
V6	Access Value						
	fresh	0.0000	0.50	0.0000	0.35	0.0000	0.35
	intermediate	0.3710		0.1900		0.1900	
		EM HSI =	0.44	EM HSI =	0.14	EM HSI =	0.12
		OW HSI =	0.23	OW HSI =	0.15	OW HSI =	0.13

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0	0
0.4	0	0
0.2	0	0
0	0.1	0.1
Salinity		
1.00	1.00	1.00
0.38	0.32	0.10
Access Value		
0.30	0.30	0.30
0.50	0.35	0.35

Project: **B5 High SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B5 High SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	665	0.72	477.33	
1	665	0.72	475.85	476.59
43	403	0.45	180.90	13302.67
53	0	0.14	0.00	694.51
70	0	0.14	0.00	0.00
Max=	70		AAHUs =	206.77

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	665	0.72	477.33	
1	665	0.72	475.85	476.59
5	655	0.69	455.10	1861.77
43	403	0.44	177.39	11610.99
53	0	0.14	0.00	687.08
70	0	0.12	0.00	0.00
Max=	70		AAHUs	209.09

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	209.09
B. Future Without Project Emergent Marsh AAHUs =	206.77
Net Change (FWP - FWOP) =	2.32

AAHU CALCULATION - OPEN WATER

Project: **B5 High SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	343	0.35	120.53	
1	343	0.35	120.02	120.28
43	605	0.22	135.39	5595.01
53	1,008	0.16	161.54	1527.30
70	1,008	0.16	161.54	2746.14
Max=	70		AAHUs =	142.70

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	343	0.35	120.53	
1	343	0.35	120.02	120.28
5	353	0.36	125.51	491.03
43	605	0.23	136.50	5185.56
53	1,008	0.15	146.21	1467.67
70	1,008	0.13	129.79	2346.01
Max=	70		AAHUs	137.29

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	137.29
B. Future Without Project Open Water AAHUs =	142.70
Net Change (FWP - FWOP) =	-5.40

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	2.32
B. Open Water Habitat Net AAHUs =	-5.40
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.17

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B4 Low SLR**

Condition: Future Without Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	33	0.40
V2	% Aquatic	6	0.15	6	0.15	3	0.13
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.27
	Class 2	24		23		4	
	Class 3	50		50		25	
	Class 4	26		27		71	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	3	0.13
V5	Salinity (ppt)						
	fresh	0	0.82	0	1.00	0	1.00
	intermediate	3.4		0		0	
V6	Access Value						
	fresh	0.0000	0.99	0.0000	0.99	0.0000	0.99
	intermediate	0.9830		0.9830		0.9830	
	Emergent Marsh HSI =		0.61	EM HSI =	0.62	EM HSI =	0.50
	Open Water HSI =		0.29	OW HSI =	0.31	OW HSI =	0.27

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	1.00	1.00
Access Value		
0.30	0.30	0.30
0.99	0.99	0.99

Project: **B4 Low SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B4 Low SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B4 Low SLR**

Condition: Future With Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	48	0.53
V2	% Aquatic	6	0.15	11	0.20	11	0.20
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.39
	Class 2	24		23		22	
	Class 3	50		50		49	
	Class 4	26		27		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	5	0.16
V5	Salinity (ppt)						
	fresh	0	0.82	0	1.00	0	1.00
	intermediate	3.4		0		0	
V6	Access Value						
	fresh	0.0000	0.99	0.0000	0.20	0.0000	0.20
	intermediate	0.983		0.0000		0.0000	
	Emergent Marsh HSI =		0.61	EM HSI =	0.51	EM HSI =	0.51
	Open Water HSI =		0.29	OW HSI =	0.27	OW HSI =	0.27

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	1.00	1.00
Access Value		
0.30	0.30	0.30
0.99	0.20	0.20

Project: **B4 Low SLR**

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	44	0.50	38	0.44	33	0.40
V2	% Aquatic	10	0.19	8	0.17	6	0.15
V3	Interspersion	%		%		%	
	Class 1	0	0.35	0	0.30	0	0.27
	Class 2	14		5		4	
	Class 3	49		40		25	
	Class 4	37		55		71	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	4	0.15	3	0.13	3	0.13
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	0.48	EM HSI =	0.45	EM HSI =	0.42
		OW HSI =	0.26	OW HSI =	0.25	OW HSI =	0.23

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B4 Low SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: B4 Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.61	1256.33	
1	2029	0.62	1257.47	1256.99
70	1367	0.50	683.53	66052.93
Max=	70		AAHUs =	961.57

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.61	1256.33	
1	2029	0.51	1037.10	1146.05
5	1988	0.51	1004.98	4084.00
70	1367	0.42	568.81	50546.61
Max=	70		AAHUs	796.81

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	796.81
B. Future Without Project Emergent Marsh AAHUs =	961.57
Net Change (FWP - FWOP) =	-164.76

AAHU CALCULATION - OPEN WATER

Project: B4 Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.29	604.85	
1	2,112	0.31	644.66	624.66
70	2,774	0.27	745.06	48224.13
Max=	70		AAHUs =	697.84

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.29	604.85	
1	2,112	0.27	569.52	587.34
5	2,153	0.27	579.61	2298.27
70	2,774	0.23	642.32	39966.31
Max=	70		AAHUs	612.17

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	612.17
B. Future Without Project Open Water AAHUs =	697.84
Net Change (FWP - FWOP) =	-85.67

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-164.76
B. Open Water Habitat Net AAHUs =	-85.67
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-139.25

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B4 Medium SLR**

Condition: Future Without Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	70
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	50	0.55	49	0.54	24	0.32
V2	% Aquatic	6	0.15	6	0.15	2	0.12
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.20
	Class 2	24		23		0	
	Class 3	50		50		0	
	Class 4	26		27		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	1	0.11
V5	Salinity (ppt)						
	fresh	0	0.82	0	0.82	0	0.60
	intermediate	3.4		3.4		4.5	
V6	Access Value						
	fresh	0.0000	0.40	0.0000	0.40	0.0000	0.40
	intermediate	0.2460		0.2460		0.2460	
	Emergent Marsh HSI =		0.54	EM HSI =	0.53	EM HSI =	0.34
	Open Water HSI =		0.25	OW HSI =	0.25	OW HSI =	0.19

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	0.82	0.60
Access Value		
0.30	0.30	0.30
0.40	0.40	0.40

Project: **B4 Medium SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B4 Medium SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B4 Medium SLR**

Condition: Future With Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

Variable		TY Value	0 SI	TY Value	1 SI	TY Value	5 SI
V1	% Emergent	50	0.55	49	0.54	48	0.53
V2	% Aquatic	6	0.15	6	0.15	8	0.17
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.39
	Class 2	24		23		22	
	Class 3	50		50		49	
	Class 4	26		27		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	4	0.15
V5	Salinity (ppt)						
	fresh	0	0.82	0	0.82	0	0.88
	intermediate	3.4		3.4		3.1	
V6	Access Value						
	fresh	0.0000	0.40	0.0000	0.40	0.0000	0.36
	intermediate	0.246		0.2460		0.2030	
	Emergent Marsh HSI =		0.54	EM HSI =	0.53	EM HSI =	0.53
	Open Water HSI =		0.25	OW HSI =	0.25	OW HSI =	0.27

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	0.82	0.88
Access Value		
0.30	0.30	0.30
0.40	0.40	0.36

Project: **B4 Medium SLR**

FWP

Variable		TY Value	24 SI	TY Value	47 SI	TY Value	70 SI
V1	% Emergent	0	0.10	0	0.10	24	0.32
V2	% Aquatic	0	0.10	0	0.10	3	0.13
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	1	0.11
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	0.66
	intermediate	0		0		4.2	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.33
	intermediate	0.0000		0.0000		0.1620	
		EM HSI =		EM HSI =		EM HSI =	0.34
		OW HSI =		OW HSI =		OW HSI =	0.20

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0.2
0	0	0
Salinity		
1.00	1.00	1.00
1.00	1.00	0.66
Access Value		
0.30	0.30	0.30
0.20	0.20	0.33

Project: **B4 Medium SLR**

FWP

Variable		TY Value	SI	TY Value	SI	TY Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B4 Medium SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.54	1118.82	
1	2029	0.53	1084.01	1101.37
70	994	0.34	342.11	46938.51
Max=	70		AAHUs =	686.28

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.54	1118.82	
1	2029	0.53	1084.01	1101.37
5	1988	0.53	1051.25	4270.37
70	994	0.34	341.01	43248.40
Max=	70		AAHUs	694.57

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	694.57
B. Future Without Project Emergent Marsh AAHUs =	686.28
Net Change (FWP - FWOP) =	8.29

AAHU CALCULATION - OPEN WATER

Project: **B4 Medium SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.25	524.54	
1	2,112	0.25	534.56	529.55
70	3,147	0.19	603.54	39994.28
Max=	70		AAHUs =	578.91

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.25	524.54	
1	2,112	0.25	534.56	529.55
5	2,153	0.27	572.04	2212.85
70	3,147	0.20	620.96	39508.74
Max=	70		AAHUs	603.59

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	603.59
B. Future Without Project Open Water AAHUs =	578.91
Net Change (FWP - FWOP) =	24.68

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	8.29
B. Open Water Habitat Net AAHUs =	24.68
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	13.58

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B4 High SLR**

Condition: Future Without Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	43
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	25	0.33
V2	% Aquatic	6	0.15	6	0.15	1	0.11
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.20
	Class 2	24		23		0	
	Class 3	50		50		0	
	Class 4	26		27		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	1	0.11
V5	Salinity (ppt)						
	fresh	0	0.82	0	0.82	0	0.48
	intermediate	3.4		3.4		5.1	
V6	Access Value						
	fresh	0.0000	0.40	0.0000	0.40	0.0000	0.40
	intermediate	0.2460		0.2460		0.2460	
	Emergent Marsh HSI =		0.54	EM HSI =	0.53	EM HSI =	0.34
	Open Water HSI =		0.25	OW HSI =	0.25	OW HSI =	0.18

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	0.82	0.48
Access Value		
0.30	0.30	0.30
0.40	0.40	0.40

Project: **B4 High SLR**

FWOP

Variable		TY	53	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)						
	fresh	0	0.40	0	0.26		
	intermediate	5.5		6.2			
V6	Access Value						
	fresh	0.0000	0.40	0.0000	0.40		
	intermediate	0.2460		0.2460			
		EM HSI =	0.15	EM HSI =	0.14	EM HSI =	
		OW HSI =	0.15	OW HSI =	0.14	OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0
Salinity		
1.00	1.00	
0.40	0.26	
Access Value		
0.30	0.30	
0.40	0.40	

Project: **B4 High SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B4 High SLR**

Condition: Future With Project

Project Area:	4,141
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	48	0.53
V2	% Aquatic	6	0.15	6	0.15	8	0.17
V3	Interspersion	%		%		%	
	Class 1	0	0.40	0	0.39	0	0.39
	Class 2	24		23		22	
	Class 3	50		50		49	
	Class 4	26		27		29	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	4	0.15
V5	Salinity (ppt)						
	fresh	0	0.82	0	0.82	0	0.86
	intermediate	3.4		3.4		3.2	
V6	Access Value						
	fresh	0.0000	0.40	0.0000	0.40	0.0000	0.36
	intermediate	0.246		0.2460		0.2030	
	Emergent Marsh HSI =		0.54	EM HSI =	0.53	EM HSI =	0.53
	Open Water HSI =		0.25	OW HSI =	0.25	OW HSI =	0.26

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.82	0.82	0.86
Access Value		
0.30	0.30	0.30
0.40	0.40	0.36

Project: **B4 High SLR**

FWP

Variable		TY	43	TY	53	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	25	0.33	0	0.10	0	0.10
V2	% Aquatic	2	0.12	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		100		100	
V4	%OW <= 1.5ft	1	0.11	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.60	0	0.54	0	0.40
	intermediate	4.5		4.8		5.5	
V6	Access Value						
	fresh	0.0000	0.30	0.0000	0.27	0.0000	0.27
	intermediate	0.1200		0.0830		0.0830	
		EM HSI =	0.33	EM HSI =	0.16	EM HSI =	0.15
		OW HSI =	0.18	OW HSI =	0.15	OW HSI =	0.14

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0.1
Salinity		
1.00	1.00	1.00
0.60	0.54	0.40
Access Value		
0.30	0.30	0.30
0.30	0.27	0.27

Project: **B4 High SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: B4 High SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.54	1118.82	
1	2029	0.53	1084.01	1101.37
43	1035	0.34	348.68	28713.02
53	0	0.15	0.00	1426.90
70	0	0.14	0.00	0.00
Max=	70		AAHUs =	446.30

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	2071	0.54	1118.82	
1	2029	0.53	1084.01	1101.37
5	1988	0.53	1046.83	4261.48
43	1035	0.33	338.08	25106.70
53	0	0.16	0.00	1407.57
70	0	0.15	0.00	0.00
Max=	70		AAHUs	455.39

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	455.39
B. Future Without Project Emergent Marsh AAHUs =	446.30
Net Change (FWP - FWOP) =	9.08

AAHU CALCULATION - OPEN WATER

Project: B4 High SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.25	524.54	
1	2,112	0.25	534.56	529.55
43	3,106	0.18	545.77	23225.35
53	4,141	0.15	638.62	5959.01
70	4,141	0.14	595.67	10491.48
Max=	70		AAHUs =	574.36

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,070	0.25	524.54	
1	2,112	0.25	534.56	529.55
5	2,153	0.26	568.85	2206.51
43	3,106	0.18	545.40	21705.55
53	4,141	0.15	638.46	5956.24
70	4,141	0.14	595.52	10488.87
Max=	70		AAHUs	584.10

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	584.10
B. Future Without Project Open Water AAHUs =	574.36
Net Change (FWP - FWOP) =	9.73

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B3 Low SLR**

Condition: Future Without Project

Project Area:	570
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	70
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	50	0.55	49	0.54	2	0.12
V2	% Aquatic	8	0.17	8	0.17	0	0.10
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	0	0.10
	Class 2	10		9		0	
	Class 3	0		0		0	
	Class 4	60		61		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.17	6	0.17	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.92	0	1.00	0	1.00
	intermediate	2.9		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		0.52	**EM HSI =**	0.52	**EM HSI =**	0.22
	Open Water HSI =		0.26	**OW HSI =**	0.26	**OW HSI =**	0.18

Intermediate Calculations		
Interspersion		
1	1	0
0.6	0.6	0
0	0	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.92	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B3 Low SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1	0					
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B3 Low SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B3 Low SLR**

Condition: Future With Project

Project Area:	570
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	5
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	50	0.55	49	0.54	46	0.51
V2	% Aquatic	8	0.17	13	0.22	13	0.22
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	23	0.43
	Class 2	10		9		11	
	Class 3	0		0		2	
	Class 4	60		61		64	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.17	6	0.17	6	0.17
V5	Salinity (ppt)						
	fresh	0	0.92	0	1.00	0	1.00
	intermediate	2.9		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		**0.52**	**EM HSI =**	**0.52**	**EM HSI =**	**0.50**
	Open Water HSI =		**0.26**	**OW HSI =**	**0.29**	**OW HSI =**	**0.28**

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.92	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B3 Low SLR**

FWP

		TY	24	TY	47	TY	70
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	33	0.40	18	0.26	2	0.12
V2	% Aquatic	10	0.19	3	0.13	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.26	0	0.20	0	0.10
	Class 2	9		0		0	
	Class 3	14		0		0	
	Class 4	77		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	2	0.12	1	0.11	0	0.10
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	**0.42**	**EM HSI =**	**0.33**	**EM HSI =**	**0.22**
		OW HSI =	**0.25**	**OW HSI =**	**0.21**	**OW HSI =**	**0.18**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0	0
0.4	0	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B3 Low SLR**

FWP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: B3 Low SLR

Future Without Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	285	0.52	147.33	
1	279	0.52	145.21	146.28
70	11	0.22	2.45	4175.67
Max=	**70**		**AAHUs =**	**61.74**

Future With Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	285	0.52	147.33	
1	279	0.52	145.21	146.28
5	262	0.50	131.18	552.56
70	11	0.22	2.45	3586.30
Max=	**70**		**AAHUs**	**61.22**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	61.22
B. Future Without Project Emergent Marsh AAHUs =	61.74
Net Change (FWP - FWOP) =	**-0.53**

AAHU CALCULATION - OPEN WATER

Project: B3 Low SLR

Future Without Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	285	0.26	72.68	
1	291	0.26	75.85	74.26
70	559	0.18	101.39	6359.27
Max=	**70**		**AAHUs =**	**91.91**

Future With Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	285	0.26	72.68	
1	291	0.29	83.55	78.08
5	308	0.28	87.43	341.99
70	559	0.18	101.39	6415.26
Max=	**70**		**AAHUs**	**97.65**

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	97.65
B. Future Without Project Open Water AAHUs =	91.91
Net Change (FWP - FWOP) =	**5.74**

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.53
B. Open Water Habitat Net AAHUs =	5.74
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	**1.50**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B3 Medium SLR**

Condition: Future Without Project

Project Area:	570
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	62
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	50	0.55	49	0.54	0	0.10
V2	% Aquatic	8	0.17	8	0.17	0	0.10
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	0	0.10
	Class 2	10		9		0	
	Class 3	0		0		0	
	Class 4	60		61		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.17	6	0.17	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.92	0	0.90	0	0.72
	intermediate	2.9		3		3.9	
V6	Access Value						
	fresh	0.0000	0.98	0.0000	0.98	0.0000	0.98
	intermediate	0.9800		0.9800		0.9800	
	Emergent Marsh HSI =		0.63	EM HSI =	0.62	EM HSI =	0.20
	Open Water HSI =		0.32	OW HSI =	0.32	OW HSI =	0.21

Intermediate Calculations		
Interspersion		
1	1	0
0.6	0.6	0
0	0	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.92	0.90	0.72
Access Value		
0.30	0.30	0.30
0.98	0.98	0.98

Project: **B3 Medium SLR**

FWOP

Variable		TY	70	TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.70				
	intermediate	4					
V6	Access Value						
	fresh	0.0000	0.98				
	intermediate	0.9800					
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.20	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.70		
Access Value		
0.30		
0.98		

Project: **B3 Medium SLR**

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B3 Medium SLR**

Condition: Future With Project

Project Area:	570
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	46	0.51
V2	% Aquatic	8	0.17	8	0.17	10	0.19
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	23	0.43
	Class 2	10		9		11	
	Class 3	0		0		2	
	Class 4	60		61		64	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.17	6	0.17	5	0.16
V5	Salinity (ppt)						
	fresh	0	0.92	0	0.90	0	0.94
	intermediate	2.9		3		2.8	
V6	Access Value						
	fresh	0.0000	0.98	0.0000	0.98	0.0000	0.84
	intermediate	0.98		0.9800		0.7970	
	Emergent Marsh HSI =		0.63	EM HSI =	0.62	EM HSI =	0.59
	Open Water HSI =		0.32	OW HSI =	0.32	OW HSI =	0.33

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.92	0.90	0.94
Access Value		
0.30	0.30	0.30
0.98	0.98	0.84

Project: **B3 Medium SLR**

FWP

Variable		TY	24	TY	47	TY	62
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	0.72
	intermediate	0		0		3.9	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.75
	intermediate	0.0000		0.0000		0.6830	
		EM HSI =		EM HSI =		EM HSI =	0.20
		OW HSI =		OW HSI =		OW HSI =	0.20

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0.1
Salinity		
1.00	1.00	1.00
1.00	1.00	0.72
Access Value		
0.30	0.30	0.30
0.20	0.20	0.75

Project: **B3 Medium SLR**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.70				
	intermediate	4					
V6	Access Value						
	fresh	0.0000	0.69				
	intermediate	0.6180					
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.19	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.70		
Access Value		
0.30		
0.69		

AAHU CALCULATION - EMERGENT MARSH

Project: B3 Medium SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	285	0.63	178.66	
1	279	0.62	172.36	175.50
62	0	0.20	0.00	4086.06
70	0	0.20	0.00	0.00
Max=	70		AAHUs =	60.88

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	285	0.63	178.66	
1	279	0.62	172.36	175.50
5	262	0.59	153.56	651.49
62	0	0.20	0.00	3415.11
70	0	0.20	0.00	0.00
Max=	70		AAHUs	60.60

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	60.60
B. Future Without Project Emergent Marsh AAHUs =	60.88
Net Change (FWP - FWOP) =	-0.28

AAHU CALCULATION - OPEN WATER

Project: B3 Medium SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	285	0.32	92.06	
1	291	0.32	93.48	92.77
62	570	0.21	117.36	6757.80
70	570	0.20	116.52	935.54
Max=	70		AAHUs =	111.23

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	285	0.32	92.06	
1	291	0.32	93.48	92.77
5	308	0.33	100.82	388.52
62	570	0.20	112.12	6393.97
70	570	0.19	109.97	888.36
Max=	70		AAHUs	110.91

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	110.91
B. Future Without Project Open Water AAHUs =	111.23
Net Change (FWP - FWOP) =	-0.32

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.28
B. Open Water Habitat Net AAHUs =	-0.32
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.29

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B3 High SLR**

Condition: Future Without Project

Project Area:	570
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	46
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	50	0.55	49	0.54	0	0.10
V2	% Aquatic	8	0.17	8	0.17	0	0.10
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	0	0.10
	Class 2	10		9		0	
	Class 3	0		0		0	
	Class 4	60		61		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.17	6	0.17	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.92	0	0.88	0	0.52
	intermediate	2.9		3.1		4.9	
V6	Access Value						
	fresh	0.0000	0.98	0.0000	0.98	0.0000	0.98
	intermediate	0.9800		0.9800		0.9800	
	Emergent Marsh HSI =		**0.63**	**EM HSI =**	**0.62**	**EM HSI =**	**0.18**
	Open Water HSI =		**0.32**	**OW HSI =**	**0.32**	**OW HSI =**	**0.19**

Intermediate Calculations		
Interspersion		
1	1	0
0.6	0.6	0
0	0	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.92	0.88	0.52
Access Value		
0.30	0.30	0.30
0.98	0.98	0.98

Project: **B3 High SLR**

FWOP

		TY	70	TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.30				
	intermediate	6					
V6	Access Value						
	fresh	0.0000	0.98				
	intermediate	0.9800					
		EM HSI =	**0.16**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.17**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.30		
Access Value		
0.30		
0.98		

Project: **B3 High SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B3 High SLR**

Condition: Future With Project

Project Area:	570
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	50	0.55	49	0.54	46	0.51
V2	% Aquatic	8	0.17	8	0.17	9	0.18
V3	Interspersion	%		%		%	
	Class 1	30	0.48	30	0.48	23	0.43
	Class 2	10		9		11	
	Class 3	0		0		2	
	Class 4	60		61		64	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.17	6	0.17	5	0.16
V5	Salinity (ppt)						
	fresh	0	0.92	0	0.88	0	0.90
	intermediate	2.9		3.1		3	
V6	Access Value						
	fresh	0.0000	0.98	0.0000	0.98	0.0000	0.84
	intermediate	0.98		0.9800		0.7940	
	Emergent Marsh HSI =		0.63	EM HSI =	0.62	EM HSI =	0.58
	Open Water HSI =		0.32	OW HSI =	0.32	OW HSI =	0.32

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.92	0.88	0.90
Access Value		
0.30	0.30	0.30
0.98	0.98	0.84

Project: **B3 High SLR**

FWP

Variable		TY	46	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)						
	fresh	0	0.62	0	0.46		
	intermediate	4.4		5.2			
V6	Access Value						
	fresh	0.0000	0.55	0.0000	0.42		
	intermediate	0.4360		0.2800			
		EM HSI =	0.18	EM HSI =	0.16	EM HSI =	
		OW HSI =	0.18	OW HSI =	0.16	OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0
Salinity		
1.00	1.00	
0.62	0.46	
Access Value		
0.30	0.30	
0.55	0.42	

Project: **B3 High SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B3 High SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	285	0.63	178.66	
1	279	0.62	171.74	175.19
46	0	0.18	0.00	2958.51
70	0	0.16	0.00	0.00
Max=	70		AAHUs =	44.77

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	285	0.63	178.66	
1	279	0.62	171.74	175.19
5	262	0.58	152.34	647.78
46	0	0.18	0.00	2410.21
70	0	0.16	0.00	0.00
Max=	70		AAHUs	46.19

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	46.19
B. Future Without Project Emergent Marsh AAHUs =	44.77
Net Change (FWP - FWOP) =	1.42

AAHU CALCULATION - OPEN WATER

Project: **B3 High SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	285	0.32	92.06	
1	291	0.32	93.05	92.55
46	570	0.19	108.92	4813.46
70	570	0.17	99.63	2502.61
Max=	70		AAHUs =	105.84

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	285	0.32	92.06	
1	291	0.32	93.05	92.55
5	308	0.32	97.50	381.14
46	570	0.18	102.48	4344.51
70	570	0.16	91.48	2327.53
Max=	70		AAHUs	102.08

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	102.08
B. Future Without Project Open Water AAHUs =	105.84
Net Change (FWP - FWOP) =	-3.76

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	1.42
B. Open Water Habitat Net AAHUs =	-3.76
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-0.25

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B1,B2 Low SLR**

Condition: Future Without Project

Project Area:	3,965
% Fresh	100
% Intermediate	0

Variable		TY Value	0 SI	TY Value	1 SI	TY Value	70 SI
V1	% Emergent	90	0.91	90	0.91	86	0.87
V2	% Aquatic	24	0.32	24	0.32	23	0.31
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	73	0.89
	Class 2	5		5		27	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	34	0.48
V5	Salinity (ppt)						
	fresh	2	0.76	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.30	0.0000	0.30	0.0000	0.30
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		0.78	EM HSI =	0.81	EM HSI =	0.78
	Open Water HSI =		0.41	OW HSI =	0.43	OW HSI =	0.41

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0
0	0	0
0	0	0
Salinity		
0.76	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B1,B2 Low SLR**

FWOP

Variable		TY Value	SI	TY Value	SI	TY Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B1,B2 Low SLR**

FWOP

Variable		TY Value	SI	TY Value	SI	TY Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B1,B2 Low SLR**

Condition: Future With Project

Project Area:	3,965
% Fresh	100
% Intermediate	0

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	90	0.91	90	0.91	90	0.91
V2	% Aquatic	24	0.32	32	0.39	32	0.39
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	95	0.98
	Class 2	5		5		5	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	35	0.49
V5	Salinity (ppt)						
	fresh	1.7	0.76	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.30	0.0000	0.30	0.0000	0.30
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		0.78	EM HSI =	0.81	EM HSI =	0.81
	Open Water HSI =		0.41	OW HSI =	0.47	OW HSI =	0.47

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0
0	0	0
0	0	0
Salinity		
0.76	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B1,B2 Low SLR**

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	89	0.90	87	0.88	86	0.87
V2	% Aquatic	32	0.39	31	0.38	31	0.38
V3	Interspersion	%		%		%	
	Class 1	94	0.98	80	0.92	73	0.89
	Class 2	6		20		27	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	34	0.48
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.30	0.0000	0.30	0.0000	0.30
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	0.80	EM HSI =	0.79	EM HSI =	0.78
		OW HSI =	0.47	OW HSI =	0.46	OW HSI =	0.45

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0
0	0	0
0	0	0
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **B1,B2 Low SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B1,B2 Low SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3569	0.78	2789.54	
1	3569	0.81	2884.72	2837.13
70	3410	0.78	2656.51	191118.72
Max=	70		AAHUs =	2770.80

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3569	0.78	2789.54	
1	3569	0.81	2884.72	2837.13
5	3569	0.81	2884.72	11538.87
70	3410	0.78	2656.51	180039.38
Max=	70		AAHUs	2777.36

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	2777.36
B. Future Without Project Emergent Marsh AAHUs =	2770.80
Net Change (FWP - FWOP) =	6.56

AAHU CALCULATION - OPEN WATER

Project: **B1,B2 Low SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	396	0.41	161.60	
1	396	0.43	168.64	165.12
70	555	0.41	229.38	13754.41
Max=	70		AAHUs =	198.85

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	396	0.41	161.60	
1	396	0.47	184.62	173.11
5	396	0.47	184.62	738.50
70	555	0.45	251.93	14209.30
Max=	70		AAHUs	216.01

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	216.01
B. Future Without Project Open Water AAHUs =	198.85
Net Change (FWP - FWOP) =	17.16

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B1,B2 Medium SLR**

Condition: Future Without Project

Project Area:	3,965
% Fresh	100
% Intermediate	0

		TY	0	TY	1	TY	70
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	90	0.91	90	0.91	76	0.78
V2	% Aquatic	24	0.32	24	0.32	21	0.29
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	47	0.74
	Class 2	5		5		29	
	Class 3	0		0		24	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	25	0.38
V5	Salinity (ppt)						
	fresh	2	0.76	2	0.76	2	0.66
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.9860	0.99	0.9860	0.99	0.9860	0.99
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		0.91	**EM HSI =**	0.91	**EM HSI =**	0.79
	Open Water HSI =		0.49	**OW HSI =**	0.49	**OW HSI =**	0.44

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0	0	0
0	0	0
Salinity		
0.76	0.76	0.66
1.00	1.00	1.00
Access Value		
0.99	0.99	0.99
0.20	0.20	0.20

Project: **B1,B2 Medium SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

Project: **B1,B2 Medium SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **B1,B2 Medium SLR**

Condition: Future With Project

Project Area:	3,965
% Fresh	100
% Intermediate	0

Variable		TY	0	TY	1	TY	5
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	90	0.91	90	0.91	90	0.91
V2	% Aquatic	24	0.32	24	0.32	25	0.33
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	95	0.98
	Class 2	5		5		5	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	35	0.49
V5	Salinity (ppt)						
	fresh	1.7	0.76	2	0.76	1.6	0.78
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.9860	0.99	0.9860	0.99	0.8040	0.86
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		0.91	EM HSI =	0.91	EM HSI =	0.90
	Open Water HSI =		0.49	OW HSI =	0.49	OW HSI =	0.49

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0
0	0	0
0	0	0
Salinity		
0.76	0.76	0.78
1.00	1.00	1.00
Access Value		
0.99	0.99	0.86
0.20	0.20	0.20

Project: **B1,B2 Medium SLR**

FWP

Variable		TY	24	TY	47	TY	70
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10	76	0.78
V2	% Aquatic	0	0.10	0	0.10	21	0.29
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	47	0.74
	Class 2	0		0		29	
	Class 3	0		0		24	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	25	0.38
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	2.3	0.64
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.30	0.0000	0.30	0.6250	0.74
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =		EM HSI =		EM HSI =	0.76
		OW HSI =		OW HSI =		OW HSI =	0.41

Intermediate Calculations		
Interspersion		
0	0	1
0	0	0.6
0	0	0.4
0	0	0
0	0	0
Salinity		
1.00	1.00	0.64
1.00	1.00	1.00
Access Value		
0.30	0.30	0.74
0.20	0.20	0.20

Project: **B1,B2 Medium SLR**

FWP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **B1,B2 Medium SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3569	0.91	3251.88	
1	3569	0.91	3251.88	3251.88
70	3013	0.79	2378.86	193482.75
Max=	70		AAHUs =	2810.49

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3569	0.91	3251.88	
1	3569	0.91	3251.88	3251.88
5	3569	0.90	3201.67	12907.10
70	3013	0.76	2280.63	177330.53
Max=	70		AAHUs	2764.14

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	2764.14
B. Future Without Project Emergent Marsh AAHUs =	2810.49
Net Change (FWP - FWOP) =	-46.36

AAHU CALCULATION - OPEN WATER

Project: **B1,B2 Medium SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	396	0.49	195.02	
1	396	0.49	195.02	195.02
70	952	0.44	416.75	21455.65
Max=	70		AAHUs =	309.30

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	396	0.49	195.02	
1	396	0.49	195.02	195.02
5	396	0.49	193.88	777.80
70	952	0.41	394.66	19579.76
Max=	70		AAHUs	293.61

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	293.61
B. Future Without Project Open Water AAHUs =	309.30
Net Change (FWP - FWOP) =	-15.69

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-46.36
B. Open Water Habitat Net AAHUs =	-15.69
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-36.46

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B1,B2 High SLR**

Project Area:	3,965
% Fresh	100
% Intermediate	0

Condition: Future Without Project

Variable		TY	0	TY	1	TY	43
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	90	0.91	90	0.91	67	0.70
V2	% Aquatic	24	0.32	24	0.32	17	0.25
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	6	0.54
	Class 2	5		5		54	
	Class 3	0		0		40	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	18	0.30
V5	Salinity (ppt)						
	fresh	1.7	0.76	1.7	0.76	2.8	0.54
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.9860	0.99	0.9860	0.99	0.9860	0.99
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		0.91	**EM HSI =**	0.91	**EM HSI =**	0.70
	Open Water HSI =		0.49	**OW HSI =**	0.49	**OW HSI =**	0.38

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0.4
0	0	0
0	0	0
Salinity		
0.76	0.76	0.54
1.00	1.00	1.00
Access Value		
0.99	0.99	0.99
0.20	0.20	0.20

Project: **B1,B2 High SLR**

FWOP

Variable		TY	53	TY	70	TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)						
	fresh	3	0.50	3.4	0.42		
	intermediate	0		0			
V6	Access Value						
	fresh	0.9860	0.99	0.9860	0.99		
	intermediate	0.0000		0.0000			
		EM HSI =	0.18	**EM HSI =**	0.17	**EM HSI =**	
		OW HSI =	0.19	**OW HSI =**	0.18	**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0
Salinity		
0.50	0.42	
1.00	1.00	
Access Value		
0.99	0.99	
0.20	0.20	

Project: **B1,B2 High SLR**

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **B1,B2 High SLR**

Condition: Future With Project

Project Area:	3,965
% Fresh	100
% Intermediate	0

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	90	0.91	90	0.91	89	0.90
V2	% Aquatic	24	0.32	24	0.32	24	0.32
V3	Interspersion	%		%		%	
	Class 1	95	0.98	95	0.98	94	0.98
	Class 2	5		5		6	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	35	0.49	35	0.49	35	0.49
V5	Salinity (ppt)						
	fresh	1.7	0.76	1.7	0.76	1.7	0.76
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.9860	0.99	0.9860	0.99	0.8010	0.86
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		0.91	EM HSI =	0.91	EM HSI =	0.89
	Open Water HSI =		0.49	OW HSI =	0.49	OW HSI =	0.48

Intermediate Calculations		
Interspersion		
1	1	1
0.6	0.6	0.6
0	0	0
0	0	0
0	0	0
Salinity		
0.76	0.76	0.76
1.00	1.00	1.00
Access Value		
0.99	0.99	0.86
0.20	0.20	0.20

Project: **B1,B2 High SLR**

FWP

Variable		TY	43	TY	53	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	67	0.70	0	0.10	0	0.10
V2	% Aquatic	17	0.25	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	6	0.54	0	0.10	0	0.10
	Class 2	54		0		0	
	Class 3	40		0		0	
	Class 4	0		0		0	
	Class 5	0		100		100	
V4	%OW <= 1.5ft	18	0.30	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	2.5	0.60	2.6	0.58	3.1	0.48
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.4450	0.61	0.2860	0.50	0.2860	0.50
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	0.66	EM HSI =	0.18	EM HSI =	0.17
		OW HSI =	0.35	OW HSI =	0.17	OW HSI =	0.17

Intermediate Calculations		
Interspersion		
1	0	0
0.6	0	0
0.4	0	0
0	0	0
0	0.1	0.1
Salinity		
0.60	0.58	0.48
1.00	1.00	1.00
Access Value		
0.61	0.50	0.50
0.20	0.20	0.20

Project: **B1,B2 High SLR**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: B1,B2 High SLR

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	3569	0.91	3251.88	
1	3569	0.91	3251.88	3251.88
43	2657	0.70	1858.16	105958.75
53	0	0.18	0.00	6993.82
70	0	0.17	0.00	0.00
Max=	70		AAHUs =	1660.06

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	3569	0.91	3251.88	
1	3569	0.91	3251.88	3251.88
5	3529	0.89	3134.96	12773.07
43	2657	0.66	1757.15	91696.35
53	0	0.18	0.00	6642.17
70	0	0.17	0.00	0.00
Max=	70		AAHUs	1633.76

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	1633.76
B. Future Without Project Emergent Marsh AAHUs =	1660.06
Net Change (FWP - FWOP) =	-26.30

AAHU CALCULATION - OPEN WATER

Project: B1,B2 High SLR

Future Without Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	396	0.49	195.02	
1	396	0.49	195.02	195.02
43	1,308	0.38	496.36	15240.17
53	3,965	0.19	752.65	7084.88
70	3,965	0.18	729.15	12595.26
Max=	70		AAHUs =	501.65

Future With Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	396	0.49	195.02	
1	396	0.49	195.02	195.02
5	436	0.48	209.68	809.69
43	1,308	0.35	461.07	13453.41
53	3,965	0.17	690.28	6546.84
70	3,965	0.17	660.91	11485.18
Max=	70		AAHUs	464.14

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	464.14
B. Future Without Project Open Water AAHUs =	501.65
Net Change (FWP - FWOP) =	-37.50

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-26.30
B. Open Water Habitat Net AAHUs =	-37.50
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-29.91

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 35 Year Low SLR** Project Area: 462

Condition: Future Without Project

Variable		TY	0	TY	1	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	54	0.59	54	0.59	25	0.33
V2	% Aquatic	6	0.15	6	0.15	2	0.12
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.20
	Class 2	58		58		0	
	Class 3	0		0		0	
	Class 4	42		42		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	2	0.13
V5	Salinity (ppt)	5	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		**0.46**	**EM HSI =**	**0.46**	**EM HSI =**	**0.33**
	Open Water HSI =		**0.22**	**OW HSI =**	**0.22**	**OW HSI =**	**0.18**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year Low SLR** Project Area: 462

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Project: **C20 35 Year Low SLR** Project Area: 462

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C20 35 Year Low SLR** Project Area: 462

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	54	0.59	54	0.59	52	0.57
V2	% Aquatic	6	0.15	8	0.17	8	0.17
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.42
	Class 2	58		58		54	
	Class 3	0		0		0	
	Class 4	42		42		46	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	10	0.23
V5	Salinity (ppt)	5.4	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		0.46	EM HSI =	0.46	EM HSI =	0.45
	Open Water HSI =		0.22	OW HSI =	0.23	OW HSI =	0.23

Intermediate Calculations

Interspersion

0	0	0
0.6	0.6	0.6
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year Low SLR** Project Area: 462

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	44	0.50	34	0.41	25	0.33
V2	% Aquatic	7	0.16	5	0.15	4	0.14
V3	Interspersion	%		%		%	
	Class 1	0	0.35	0	0.27	0	0.20
	Class 2	30		0		0	
	Class 3	16		37		0	
	Class 4	54		63		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	8	0.20	6	0.18	2	0.13
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	0.42	EM HSI =	0.37	EM HSI =	0.33
		OW HSI =	0.22	OW HSI =	0.20	OW HSI =	0.19

Intermediate Calculations

Interspersion

0	0	0
0.6	0	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year Low SLR** Project Area: 462

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C20 35 Year Low SLR

Future Without Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	249	0.46	115.08	
1	249	0.46	115.08	115.08
70	116	0.33	37.81	5066.27
Max TY=	70		AAHUs =	74.02

Future With Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	249	0.46	115.08	
1	249	0.46	115.08	115.08
5	240	0.45	108.77	447.66
70	116	0.33	37.81	4592.79
Max TY=	70		AAHUs	73.65

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	73.65
B. Future Without Project Emergent Marsh AAHUs =	74.02
Net Change (FWP - FWOP) =	-0.37

AAHU CALCULATION - OPEN WATER

Project: C20 35 Year Low SLR

Future Without Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	213	0.22	47.87	
1	213	0.22	47.87	47.87
70	346	0.18	63.70	3911.25
Max TY=	70		AAHUs =	56.56

Future With Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	213	0.22	47.87	
1	213	0.23	49.34	48.61
5	222	0.23	50.95	200.60
70	346	0.19	66.34	3862.76
Max TY=	70		AAHUs	58.74

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	58.74
B. Future Without Project Open Water AAHUs =	56.56
Net Change (FWP - FWOP) =	2.18

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.37
B. Open Water Habitat Net AAHUs =	2.18
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	0.34

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C20 35 Year Medium SLR** Project Area: 462

Condition: Future Without Project

Variable		TY	0	TY	1	TY	70
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	54	0.59	54	0.59	15	0.24
V2	% Aquatic	6	0.15	6	0.15	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.20
	Class 2	58		58		0	
	Class 3	0		0		0	
	Class 4	42		42		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	0	0.10
V5	Salinity (ppt)	5	1.00	5.4	1.00	7.5	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.9900	0.99
	Emergent Marsh HSI =		**0.67**	**EM HSI =**	**0.67**	**EM HSI =**	**0.39**
	Open Water HSI =		**0.38**	**OW HSI =**	**0.38**	**OW HSI =**	**0.29**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year Medium SLR** Project Area: 462

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Project: **C20 35 Year Medium SLR** Project Area: 462

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 35 Year Medium SLR** Project Area: 462

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	54	0.59	54	0.59	52	0.57
V2	% Aquatic	6	0.15	6	0.15	7	0.16
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.42
	Class 2	58		58		54	
	Class 3	0		0		0	
	Class 4	42		42		46	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	10	0.23
V5	Salinity (ppt)	5.4	1.00	5.4	1.00	5.1	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.5960	0.64
	Emergent Marsh HSI	=	0.67	EM HSI =	0.67	EM HSI =	0.61
	Open Water HSI	=	0.38	OW HSI =	0.38	OW HSI =	0.34

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year Medium SLR** Project Area: 462

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	15	0.24
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	8.1	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.4560	0.51
		EM HSI =		EM HSI =		EM HSI =	0.35
		OW HSI =		OW HSI =		OW HSI =	0.25

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0.2
0	0	0

Project: **C20 35 Year Medium SLR** Project Area: 462

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C20 35 Year Medium SLR

Future Without Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	249	0.67	167.74	
1	249	0.67	167.74	167.74
70	69	0.39	26.78	6119.74
Max TY=	70		AAHUs =	89.82

Future With Project			Total	Cummulative
TY	**Marsh Acres**	**x HSI**	**HUs**	**HUs**
0	249	0.67	167.74	
1	249	0.67	167.74	167.74
5	240	0.61	146.61	628.31
70	69	0.35	24.28	5074.25
Max TY=	70		AAHUs	83.86

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	83.86
B. Future Without Project Emergent Marsh AAHUs =	89.82
Net Change (FWP - FWOP) =	-5.96

AAHU CALCULATION - OPEN WATER

Project: C20 35 Year Medium SLR

Future Without Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	213	0.38	80.13	
1	213	0.38	80.13	80.13
70	393	0.29	114.35	6885.84
Max TY=	70		AAHUs =	99.51

Future With Project			Total	Cummulative
TY	**Water Acres**	**x HSI**	**HUs**	**HUs**
0	213	0.38	80.13	
1	213	0.38	80.13	80.13
5	222	0.34	75.57	311.62
70	393	0.25	96.51	5768.59
Max TY=	70		AAHUs	88.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	88.00
B. Future Without Project Open Water AAHUs =	99.51
Net Change (FWP - FWOP) =	-11.51

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-5.96
B. Open Water Habitat Net AAHUs =	-11.51
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-7.50

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C20 35 Year High SLR** Project Area: 462

Condition: Future Without Project

Variable		TY	0	TY	1	TY	33
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	54	0.59	54	0.59	30	0.37
V2	% Aquatic	6	0.15	6	0.15	1	0.11
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.24
	Class 2	58		58		0	
	Class 3	0		0		19	
	Class 4	42		42		81	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	1	0.11
V5	Salinity (ppt)	5.4	1.00	5.5	1.00	7.2	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.9900	0.99
	Emergent Marsh HSI	**=**	**0.67**	**EM HSI =**	**0.67**	**EM HSI =**	**0.50**
	Open Water HSI	**=**	**0.38**	**OW HSI =**	**0.38**	**OW HSI =**	**0.31**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0	0	0.4
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year High SLR** Project Area: 462

FWOP

Variable		TY	43	TY	70	TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	7.7	1.00	9.1	1.00		
V6	Access Value	0.9900	0.99	0.9900	0.99		
		EM HSI =	**0.25**	**EM HSI =**	**0.25**	**EM HSI =**	
		OW HSI =	**0.28**	**OW HSI =**	**0.28**	**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **C20 35 Year High SLR** Project Area: 462

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 35 Year High SLR** Project Area: 462

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	54	0.59	54	0.59	52	0.57
V2	% Aquatic	6	0.15	6	0.15	7	0.16
V3	Interspersion	%		%		%	
	Class 1	0	0.43	0	0.43	0	0.42
	Class 2	58		58		54	
	Class 3	0		0		0	
	Class 4	42		42		46	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	10	0.23
V5	Salinity (ppt)	5.4	1.00	5.5	1.00	5.2	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.5940	0.63
	Emergent Marsh HSI =		0.67	EM HSI =	0.67	EM HSI =	0.61
	Open Water HSI =		0.38	OW HSI =	0.38	OW HSI =	0.34

Intermediate Calculations

Interspersion

0	0	0
0.6	0.6	0.6
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C20 35 Year High SLR** Project Area: 462

FWP

Variable		TY	33	TY	43	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	30	0.37	0	0.10	0	0.10
V2	% Aquatic	2	0.12	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	19		0		0	
	Class 4	81		0		0	
	Class 5	0		100		100	
V4	%OW <= 1.5ft	1	0.11	0	0.10	0	0.10
V5	Salinity (ppt)	6.8	1.00	6.9	1.00	8.3	1.00
V6	Access Value	0.5250	0.57	0.3140	0.38	0.1900	0.27
		EM HSI =	0.46	EM HSI =	0.23	EM HSI =	0.22
		OW HSI =	0.27	OW HSI =	0.22	OW HSI =	0.20

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0	0
0.2	0	0
0	0.1	0.1

Project: **C20 35 Year High SLR** Project Area: 462

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C20 35 Year High SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	249	0.67	167.74	
1	249	0.67	167.74	167.74
33	139	0.50	69.33	3690.53
43	0	0.25	0.00	290.01
70	0	0.25	0.00	0.00
Max TY=	70		AAHUs =	59.26

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	249	0.67	167.74	
1	249	0.67	167.74	167.74
5	240	0.61	146.53	628.16
33	139	0.46	63.36	2865.60
43	0	0.23	0.00	264.08
70	0	0.22	0.00	0.00
Max TY=	70		AAHUs	56.08

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	56.08
B. Future Without Project Emergent Marsh AAHUs =	59.26
Net Change (FWP - FWOP) =	-3.18

AAHU CALCULATION - OPEN WATER

Project: C20 35 Year High SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	213	0.38	80.13	
1	213	0.38	80.13	80.13
33	323	0.31	98.53	2900.33
43	462	0.28	131.00	1152.66
70	462	0.28	131.00	3537.04
Max TY=	70		AAHUs =	109.57

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	213	0.38	80.13	
1	213	0.38	80.13	80.13
5	222	0.34	75.52	311.51
33	323	0.27	88.08	2322.17
43	462	0.22	102.53	964.78
70	462	0.20	94.61	2661.32
Max TY=	70		AAHUs	90.57

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	90.57
B. Future Without Project Open Water AAHUs =	109.57
Net Change (FWP - FWOP) =	-19.00

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-3.18
B. Open Water Habitat Net AAHUs =	-19.00
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-7.58

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C20 100 Year Low SLR** Project Area: 439

Condition: Future Without Project

		TY	0	TY	1	TY	70
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	56	0.60	55	0.60	25	0.33
V2	% Aquatic	6	0.15	6	0.15	2	0.12
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.20
	Class 2	60		57		0	
	Class 3	4		6		0	
	Class 4	36		37		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	4	0.15
V5	Salinity (ppt)	5.4	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		**0.47**	**EM HSI =**	**0.47**	**EM HSI =**	**0.33**
	Open Water HSI =		**0.23**	**OW HSI =**	**0.23**	**OW HSI =**	**0.19**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year Low SLR** Project Area: 439

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Project: **C20 100 Year Low SLR** Project Area: 439

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 100 Year Low SLR** Project Area: 439

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	56	0.60	55	0.60	54	0.59
V2	% Aquatic	6	0.15	8	0.17	8	0.17
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.43
	Class 2	60		57		55	
	Class 3	4		6		6	
	Class 4	36		37		39	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	10	0.23
V5	Salinity (ppt)	5.4	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		0.47	EM HSI =	0.47	EM HSI =	0.46
	Open Water HSI =		0.23	OW HSI =	0.23	OW HSI =	0.23

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year Low SLR** Project Area: 439

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	45	0.51	35	0.42	25	0.33
V2	% Aquatic	7	0.16	5	0.15	4	0.14
V3	Interspersion	%		%		%	
	Class 1	0	0.36	0	0.28	0	0.20
	Class 2	32		0		0	
	Class 3	16		40		0	
	Class 4	52		60		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	8	0.20	6	0.18	4	0.15
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	0.42	EM HSI =	0.37	EM HSI =	0.33
		OW HSI =	0.22	OW HSI =	0.21	OW HSI =	0.19

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year Low SLR** Project Area: 439

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C20 100 Year Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.47	115.89	
1	241	0.47	112.46	114.17
70	110	0.33	35.85	4904.76
Max TY=	70		AAHUs =	71.70

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.47	115.89	
1	241	0.47	112.46	114.17
5	237	0.46	109.54	443.99
70	110	0.33	35.85	4537.62
Max TY=	70		AAHUs	72.80

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	72.80
B. Future Without Project Emergent Marsh AAHUs =	71.70
Net Change (FWP - FWOP) =	1.10

AAHU CALCULATION - OPEN WATER

Project: C20 100 Year Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.23	43.60	
1	198	0.23	44.62	44.11
70	329	0.19	61.20	3709.73
Max TY=	70		AAHUs =	53.63

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.23	43.60	
1	198	0.23	45.98	44.79
5	202	0.23	46.60	185.17
70	329	0.19	63.71	3636.03
Max TY=	70		AAHUs	55.23

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	55.23
B. Future Without Project Open Water AAHUs =	53.63
Net Change (FWP - FWOP) =	1.60

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	1.10
B. Open Water Habitat Net AAHUs =	1.60
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	1.24

3/24/2013

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 100 Year Medium SLR** Project Area: 439

Condition: Future Without Project

Variable		TY	0	TY	1	TY	70
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	56	0.60	55	0.60	15	0.24
V2	% Aquatic	6	0.15	6	0.15	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.20
	Class 2	60		57		0	
	Class 3	4		6		0	
	Class 4	36		37		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	1	0.11
V5	Salinity (ppt)	5.4	1.00	5.4	1.00	7.5	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.9900	0.99
	Emergent Marsh HSI =		**0.69**	**EM HSI =**	**0.68**	**EM HSI =**	**0.39**
	Open Water HSI =		**0.38**	**OW HSI =**	**0.38**	**OW HSI =**	**0.29**

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0.4	0.4	0
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year Medium SLR** Project Area: 439

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

Project: **C20 100 Year Medium SLR** Project Area: 439

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 100 Year Medium SLR** Project Area: 439

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	56	0.60	55	0.60	53	0.58
V2	% Aquatic	6	0.15	6	0.15	7	0.16
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.42
	Class 2	60		57		53	
	Class 3	4		6		6	
	Class 4	36		37		41	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	10	0.23
V5	Salinity (ppt)	5.4	1.00	5.4	1.00	5.1	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.5960	0.64
	Emergent Marsh HSI =		0.69	EM HSI =	0.68	EM HSI =	0.62
	Open Water HSI =		0.38	OW HSI =	0.38	OW HSI =	0.34

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year Medium SLR** Project Area: 439

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	15	0.24
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	1	0.11
V5	Salinity (ppt)	0	1.00	0	1.00	8.1	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.4560	0.51
		EM HSI =		EM HSI =		EM HSI =	0.35
		OW HSI =		OW HSI =		OW HSI =	0.25

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0.2
0	0	0

Project: **C20 100 Year Medium SLR** Project Area: 439

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C20 100 Year Medium SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.69	169.13	
1	241	0.68	164.02	166.57
70	66	0.39	25.62	5953.90
Max TY=	70		AAHUs =	87.44

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.69	169.13	
1	241	0.68	164.02	166.57
5	233	0.62	143.82	615.35
70	66	0.35	23.23	4949.11
Max TY=	70		AAHUs	81.87

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	81.87
B. Future Without Project Emergent Marsh AAHUs =	87.44
Net Change (FWP - FWOP) =	-5.56

AAHU CALCULATION - OPEN WATER

Project: C20 100 Year Medium SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.38	72.83	
1	198	0.38	74.60	73.72
70	373	0.29	108.88	6501.08
Max TY=	70		AAHUs =	93.93

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.38	72.83	
1	198	0.38	74.60	73.72
5	206	0.34	70.25	289.90
70	373	0.25	91.96	5442.69
Max TY=	70		AAHUs	82.95

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	82.95
B. Future Without Project Open Water AAHUs =	93.93
Net Change (FWP - FWOP) =	-10.98

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-5.56
B. Open Water Habitat Net AAHUs =	-10.98
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-7.07

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 100 Year High SLR** Project Area: 439

Condition: Future Without Project

Variable		TY	0	TY	1	TY	33
		Value	SI	Value	SI	Value	SI
V1	% Emergent	56	0.60	55	0.60	31	0.38
V2	% Aquatic	6	0.15	6	0.15	1	0.11
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.25
	Class 2	60		57		0	
	Class 3	4		6		24	
	Class 4	36		37		76	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	5	0.16
V5	Salinity (ppt)	5.4	1.00	5.5	1.00	7.2	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.9900	0.99
	Emergent Marsh HSI =		0.69	**EM HSI =**	0.68	**EM HSI =**	0.51
	Open Water HSI =		0.38	**OW HSI =**	0.38	**OW HSI =**	0.31

Intermediate Calculations		
Interspersion		
0	0	0
0.6	0.6	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year High SLR** Project Area: 439

FWOP

Variable		TY	43	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	7.7	1.00	9.1	1.00		
V6	Access Value	0.9900	0.99	0.9900	0.99		
		EM HSI =	0.25	**EM HSI =**	0.25	**EM HSI =**	
		OW HSI =	0.28	**OW HSI =**	0.28	**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **C20 100 Year High SLR** Project Area: 439

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C20 100 Year High SLR** Project Area: 439

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	56	0.60	55	0.60	53	0.58
V2	% Aquatic	6	0.15	6	0.15	7	0.16
V3	Interspersion	%		%		%	
	Class 1	0	0.45	0	0.44	0	0.42
	Class 2	60		57		53	
	Class 3	4		6		6	
	Class 4	36		37		41	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	11	0.24	11	0.24	11	0.24
V5	Salinity (ppt)	5.4	1.00	5.5	1.00	5.2	1.00
V6	Access Value	0.9900	0.99	0.9900	0.99	0.5940	0.63
	Emergent Marsh HSI =		0.69	EM HSI =	0.68	EM HSI =	0.62
	Open Water HSI =		0.38	OW HSI =	0.38	OW HSI =	0.34

Intermediate Calculations

Interspersion

0	0	0
0.6	0.6	0.6
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C20 100 Year High SLR** Project Area: 439

FWP

Variable		TY	33	TY	43	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	31	0.38	0	0.10	0	0.10
V2	% Aquatic	2	0.12	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.25	0	ERR(<100)	0	0.10
	Class 2	0		0		0	
	Class 3	24		0		0	
	Class 4	76		0		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	2	0.13	0	0.10	0	0.10
V5	Salinity (ppt)	6.8	1.00	6.9	1.00	8.3	1.00
V6	Access Value	0.5250	0.57	0.3140	0.38	0.1900	0.27
		EM HSI =	0.46	EM HSI =		EM HSI =	0.22
		OW HSI =	0.27	OW HSI =		OW HSI =	0.20

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0	0
0.2	0	0
0	0	0.1

Project: **C20 100 Year High SLR** Project Area: 439

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

3/24/2013

AAHU CALCULATION - EMERGENT MARSH

Project: C20 100 Year High SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.69	169.13	
1	241	0.68	164.02	166.57
33	136	0.51	68.90	3629.43
43	0	0.25	0.00	287.31
70	0	0.25	0.00	0.00
Max TY=	70		AAHUs =	58.33

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	246	0.69	169.13	
1	241	0.68	164.02	166.57
5	233	0.62	143.75	615.21
33	136	0.46	62.95	2824.11
43	0		0.00	209.84
70	0	0.22	0.00	0.00
Max TY=	70		AAHUs	54.51

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	54.51
B. Future Without Project Emergent Marsh AAHUs =	58.33
Net Change (FWP - FWOP) =	-3.82

AAHU CALCULATION - OPEN WATER

Project: C20 100 Year High SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.38	72.83	
1	198	0.38	74.60	73.72
33	303	0.31	93.81	2732.25
43	439	0.28	124.48	1097.36
70	439	0.28	124.48	3360.95
Max TY=	70		AAHUs =	103.78

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	193	0.38	72.83	
1	198	0.38	74.60	73.72
5	206	0.34	70.40	290.18
33	303	0.27	83.14	2179.93
43	439		0.00	477.88
70	439	0.20	89.90	1213.62
Max TY=	70		AAHUs	60.50

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	60.50
B. Future Without Project Open Water AAHUs =	103.78
Net Change (FWP - FWOP) =	-43.27

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-3.82
B. Open Water Habitat Net AAHUs =	-43.27
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-14.78

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Bayou Dulac Low SLR** Project Area: 3,865

Condition: Future Without Project

Variable		TY	0	TY	1	TY	65
		Value	SI	Value	SI	Value	SI
V1	% Emergent	28	0.35	28	0.35	0	0.10
V2	% Aquatic	5	0.34	5	0.34	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.10
	Class 2	0		0		0	
	Class 3	12		12		0	
	Class 4	88		88		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	5	0.16	0	0.10
V5	Salinity (ppt)	8.4	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI	=	0.34	EM HSI =	0.34	EM HSI =	0.20
	Open Water HSI	=	0.21	OW HSI =	0.21	OW HSI =	0.20

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **Bayou Dulac Low SLR** Project Area: **3865**

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.20	OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Bayou Dulac Low SLR** Project Area: **3865**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Saline Marsh

Project: **Bayou Dulac Low SLR** Project Area: **3865**

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	28	0.35	28	0.35	26	0.33
V2	% Aquatic	5	0.34	6	0.34	6	0.34
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.21
	Class 2	0		0		0	
	Class 3	12		12		4	
	Class 4	88		88		96	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	5	0.16	5	0.16
V5	Salinity (ppt)	8.4	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI	=	0.34	EM HSI =	0.34	EM HSI =	0.33
	Open Water HSI	=	0.21	OW HSI =	0.21	OW HSI =	0.21

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **Bayou Dulac Low SLR** Project Area: **3865**

FWP

Variable		TY	24	TY	47	TY	65
		Value	SI	Value	SI	Value	SI
V1	% Emergent	18	0.26	8	0.17	0	0.10
V2	% Aquatic	3	0.32	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	3	0.14	1	0.11	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	0.29	EM HSI =	0.25	EM HSI =	0.20
		OW HSI =	0.21	OW HSI =	0.20	OW HSI =	0.20

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **Bayou Dulac Low SLR** Project Area: **3865**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.20	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: Bayou Dulac Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	1082	0.34	363.42	
1	1082	0.34	363.42	363.42
65	0	0.20	0.00	10061.20
70	0	0.20	0.00	0.00
Max=	70		AAHUs =	148.92

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	1082	0.34	363.42	
1	1082	0.34	363.42	363.42
5	1005	0.33	328.02	1382.38
65	0	0.20	0.00	8570.30
70	0	0.20	0.00	0.00
Max=	70		AAHUs	147.37

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	147.37
B. Future Without Project Emergent Marsh AAHUs =	148.92
Net Change (FWP - FWOP) =	-1.55

AAHU CALCULATION - OPEN WATER

Project: Bayou Dulac Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,783	0.21	594.61	
1	2,783	0.21	591.96	593.28
65	3,865	0.20	755.01	43303.36
70	3,865	0.20	755.01	3775.07
Max=	70		AAHUs =	681.02

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,783	0.21	594.61	
1	2,783	0.21	593.77	594.19
5	2,860	0.21	606.81	2401.21
65	3,865	0.20	755.01	41023.69
70	3,865	0.20	755.01	3775.07
Max=	70		AAHUs	682.77

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	682.77
B. Future Without Project Open Water AAHUs =	681.02
Net Change (FWP - FWOP) =	1.75

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-1.55
B. Open Water Habitat Net AAHUs =	1.75
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	-0.82

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Saline Marsh

Project: **Bayou Dulac Medium SLR** Project Area: 3,865

Condition: Future Without Project

Variable		**TY**	0	**TY**	1	**TY**	56
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	28	0.35	28	0.35	0	0.10
V2	% Aquatic	5	0.34	5	0.34	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.10
	Class 2	0		0		0	
	Class 3	12		12		0	
	Class 4	88		88		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	5	0.16	0	0.10
V5	Salinity (ppt)	8.4	1.00	8.4	1.00	9.4	1.00
V6	Access Value	0.9800	0.98	0.9800	0.98	0.9800	0.98
	Emergent Marsh HSI =		**0.49**	**EM HSI =**	**0.49**	**EM HSI =**	**0.26**
	Open Water HSI =		**0.67**	**OW HSI =**	**0.66**	**OW HSI =**	**0.63**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **Bayou Dulac Medium SLR** Project Area: **3865**

FWOP

Variable		**TY**	70	**TY**		**TY**	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	9.6	1.00				
V6	Access Value	0.9800	0.98				
		EM HSI =	**0.26**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.63**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Bayou Dulac Medium SLR** Project Area: **3865**

FWOP

Variable		**TY**		**TY**		**TY**	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Bayou Dulac Medium SLR** Project Area: **3865**

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	28	0.35	28	0.35	26	0.33
V2	% Aquatic	5	0.34	5	0.34	5	0.34
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.21
	Class 2	0		0		0	
	Class 3	12		12		4	
	Class 4	88		88		96	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	5	0.16	5	0.16
V5	Salinity (ppt)	8.4	1.00	8.4	1.00	8.3	1.00
V6	Access Value	0.9800	0.98	0.9800	0.98	0.8150	0.83
	Emergent Marsh HSI	**=**	**0.49**	**EM HSI =**	**0.49**	**EM HSI =**	**0.46**
	Open Water HSI	**=**	**0.67**	**OW HSI =**	**0.66**	**OW HSI =**	**0.60**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **Bayou Dulac Medium SLR** Project Area: **3865**

FWP

Variable		TY	24	TY	47	TY	56
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	ERR(<100)	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	9.5	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.7330	0.76
		EM HSI =		**EM HSI =**		**EM HSI =**	**0.25**
		OW HSI =		**OW HSI =**		**OW HSI =**	**0.54**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0.1

Project: **Bayou Dulac Medium SLR** Project Area: **3865**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	9.7	1.00				
V6	Access Value	0.6700	0.70				
		EM HSI =	**0.25**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.52**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: **Bayou Dulac Medium SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	1082	0.49	529.99	
1	1082	0.49	529.99	529.99
56	0	0.26	0.00	12294.36
70	0	0.26	0.00	0.00
Max=	70		AAHUs =	183.21

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	1082	0.49	529.99	
1	1082	0.49	529.99	529.99
5	1005	0.46	463.03	1984.56
56	0	0.25	0.00	10018.70
70	0	0.25	0.00	0.00
Max=	70		AAHUs	179.05

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	179.05
B. Future Without Project Emergent Marsh AAHUs =	183.21
Net Change (FWP - FWOP) =	-4.16

AAHU CALCULATION - OPEN WATER

Project: **Bayou Dulac Medium SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,783	0.67	1852.11	
1	2,783	0.66	1849.46	1850.79
56	3,865	0.63	2447.22	118469.97
70	3,865	0.63	2447.22	34261.08
Max=	70		AAHUs =	2208.31

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,783	0.67	1852.11	
1	2,783	0.66	1849.46	1850.79
5	2,860	0.60	1719.70	7141.56
56	3,865	0.54	2094.84	97777.08
70	3,865	0.52	2000.44	28666.96
Max=	70		AAHUs	1934.81

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1934.81
B. Future Without Project Open Water AAHUs =	2208.31
Net Change (FWP - FWOP) =	-273.51

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-4.16
B. Open Water Habitat Net AAHUs =	-273.51
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	-64.01

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Saline Marsh

Project: **Bayou Dulac High SLR** Project Area: 3,865

Condition: Future Without Project

		TY	0	TY	1	TY	30
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	28	0.35	28	0.35	10	0.19
V2	% Aquatic	5	0.34	5	0.34	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.10
	Class 2	0		0		0	
	Class 3	12		12		0	
	Class 4	88		88		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	5	0.16	0	0.10
V5	Salinity (ppt)	8.4	1.00	8.4	1.00	9.7	1.00
V6	Access Value	0.9800	0.98	0.9800	0.98	0.9800	0.98
	Emergent Marsh HSI	**=**	**0.49**	**EM HSI =**	**0.49**	**EM HSI =**	**0.35**
	Open Water HSI	**=**	**0.67**	**OW HSI =**	**0.66**	**OW HSI =**	**0.63**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **Bayou Dulac High SLR** Project Area: **3865**

FWOP

		TY	40	TY	70	TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.30	0	0.30		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	10.1	1.00	11.4	1.00		
V6	Access Value	0.9800	0.98	0.9800	0.98		
		EM HSI =	**0.26**	**EM HSI =**	**0.26**	**EM HSI =**	
		OW HSI =	**0.63**	**OW HSI =**	**0.63**	**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **Bayou Dulac High SLR** Project Area: **3865**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Bayou Dulac High SLR** Project Area: **3865**

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	28	0.35	28	0.35	26	0.33
V2	% Aquatic	5	0.34	5	0.34	5	0.34
V3	Interspersion	%		%		%	
	Class 1	0	0.22	0	0.22	0	0.21
	Class 2	0		0		0	
	Class 3	12		12		4	
	Class 4	88		88		96	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	5	0.16	5	0.16
V5	Salinity (ppt)	8.4	1.00	8.4	1.00	8.3	1.00
V6	Access Value	0.9800	0.98	0.9800	0.98	0.8130	0.83
	Emergent Marsh HSI	=	0.49	EM HSI =	0.49	EM HSI =	0.46
	Open Water HSI	=	0.67	OW HSI =	0.66	OW HSI =	0.60

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **Bayou Dulac High SLR** Project Area: **3865**

FWP

Variable		TY	30	TY	40	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	10	0.19	0	0.10	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		100		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	9.2	1.00	9.5	1.00	10.2	1.00
V6	Access Value	0.7510	0.78	0.6760	0.71	0.4100	0.47
		EM HSI =	0.33	EM HSI =	0.25	EM HSI =	0.24
		OW HSI =	0.55	OW HSI =	0.52	OW HSI =	0.41

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0.1

Project: **Bayou Dulac High SLR** Project Area: **3865**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: **Bayou Dulac High SLR**

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	1082	0.49	529.99	
1	1082	0.49	529.99	529.99
30	387	0.35	133.53	9134.71
40	0	0.26	0.00	612.74
70	0	0.26	0.00	0.00
Max=	70		AAHUs =	146.82

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	1082	0.49	529.99	
1	1082	0.49	529.99	529.99
5	1005	0.46	462.86	1984.19
30	387	0.33	128.60	7062.91
40	0	0.25	0.00	589.34
70	0	0.24	0.00	0.00
Max=	70		AAHUs	145.23

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	145.23
B. Future Without Project Emergent Marsh AAHUs =	146.82
Net Change (FWP - FWOP) =	-1.59

AAHU CALCULATION - OPEN WATER

Project: **Bayou Dulac High SLR**

Future Without Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	2,783	0.67	1852.11	
1	2,783	0.66	1849.46	1850.79
30	3,478	0.63	2202.18	58854.22
40	3,865	0.63	2447.22	23247.01
70	3,865	0.63	2447.22	73416.60
Max=	70		AAHUs =	2248.12

Future With Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	2,783	0.67	1852.11	
1	2,783	0.66	1849.46	1850.79
5	2,860	0.60	1717.49	7137.19
30	3,478	0.55	1909.01	45464.28
40	3,865	0.52	2009.53	19611.36
70	3,865	0.41	1584.45	53909.62
Max=	70		AAHUs	1828.19

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1828.19
B. Future Without Project Open Water AAHUs =	2248.12
Net Change (FWP - FWOP) =	-419.93

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-1.59
B. Open Water Habitat Net AAHUs =	-419.93
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	-94.55

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Robin Canal Low SLR** Project Area: 9,923

Condition: Future Without Project

Variable		TY	0	TY	1	TY	11
		Value	SI	Value	SI	Value	SI
V1	% Emergent	8	0.17	7	0.16	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	2	0.13	2	0.13	0	0.10
V5	Salinity (ppt)	12	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		0.25	EM HSI =	0.25	EM HSI =	0.20
	Open Water HSI =		0.20	OW HSI =	0.20	OW HSI =	0.20

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **Robin Canal Low SLR** Project Area: **9923**

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.20	OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Robin Canal Low SLR** Project Area: **9923**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Saline Marsh

Project: **Robin Canal Low SLR** Project Area: **9923**

Condition: Future With Project

		TY	0	TY	1	TY	5
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	8	0.17	7	0.16	4	0.14
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	2	0.13	2	0.13	1	0.11
V5	Salinity (ppt)	12	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI	**=**	**0.25**	**EM HSI =**	**0.25**	**EM HSI =**	**0.23**
	Open Water HSI	**=**	**0.20**	**OW HSI =**	**0.20**	**OW HSI =**	**0.20**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **Robin Canal Low SLR** Project Area: **9923**

FWP

		TY	11	TY	24	TY	47
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		100		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	**0.20**	**EM HSI =**	**0.20**	**EM HSI =**	**0.20**
		OW HSI =	**0.20**	**OW HSI =**	**0.20**	**OW HSI =**	**0.20**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0.1

Project: **Robin Canal Low SLR** Project Area: **9923**

FWP

		TY	70	TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	**0.20**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.20**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - OPEN WATER

Project: Robin Canal Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	9,129	0.20	1868.33	
1	9228	0.20	1888.59	1878.46
11	9923	0.20	1938.42	19145.85
70	9923	0.20	1938.42	114366.86
Max=	70		AAHUs =	1934.16

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	9,129	0.20	1868.33	
1	9228	0.20	1888.59	1878.46
5	9526	0.20	1940.51	7658.39
11	9923	0.20	1938.42	11640.10
70	9923	0.20	1938.42	114366.86
Max=	70		AAHUs	1936.34

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1936.34
B. Future Without Project Open Water AAHUs =	1934.16
Net Change (FWP - FWOP) =	2.18

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.22
B. Open Water Habitat Net AAHUs =	2.18
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	0.31

3/24/2013

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Robin Canal Medium SLR** Project Area: 9,923

Condition: Future Without Project

Variable		TY	0	TY	1	TY	10
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	8	0.17	7	0.16	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	1	0.11	1	0.11	0	0.10
V5	Salinity (ppt)	12	1.00	12	1.00	12.2	1.00
V6	Access Value	0.9600	0.96	0.9600	0.96	0.9600	0.96
	Emergent Marsh HSI	**=**	**0.34**	**EM HSI =**	**0.33**	**EM HSI =**	**0.26**
	Open Water HSI	**=**	**0.63**	**OW HSI =**	**0.63**	**OW HSI =**	**0.63**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **Robin Canal Medium SLR** Project Area: **9923**

FWOP

Variable		TY	70	TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	13.2	1.00				
V6	Access Value	0.9600	0.96				
		EM HSI =	**0.26**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.63**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Robin Canal Medium SLR** Project Area: **9923**

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Robin Canal Medium SLR** Project Area: **9923**

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	8	0.17	7	0.16	4	0.14
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	1	0.11	1	0.11	0	0.10
V5	Salinity (ppt)	12	1.00	12	1.00	11.8	1.00
V6	Access Value	0.9600	0.96	0.9600	0.96	0.8910	0.90
	Emergent Marsh HSI =		0.34	EM HSI =	0.33	EM HSI =	0.30
	Open Water HSI =		0.63	OW HSI =	0.63	OW HSI =	0.61

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **Robin Canal Medium SLR** Project Area: **9923**

FWP

Variable		TY	10	TY	24	TY	47
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	ERR(<100)	0	ERR(<100)
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	12	1.00	0	1.00	0	1.00
V6	Access Value	0.8780	0.89	0.0000	0.10	0.0000	0.10
		EM HSI =	0.26	EM HSI =		EM HSI =	
		OW HSI =	0.60	OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Robin Canal Medium SLR** Project Area: **9923**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	13.2	1.00				
V6	Access Value	0.8310	0.85				
		EM HSI =	0.25	EM HSI =		EM HSI =	
		OW HSI =	0.58	OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: Robin Canal Medium SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	794	0.34	269.30	
1	695	0.33	230.07	249.55
10	0	0.26	0.00	960.50
70	0	0.26	0.00	0.00
Max=	70		AAHUs =	17.29

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	794	0.34	269.30	
1	695	0.33	230.07	249.55
5	397	0.30	120.32	695.23
10	0	0.26	0.00	285.42
70	0	0.25	0.00	0.00
Max=	70		AAHUs	17.57

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	17.57
B. Future Without Project Emergent Marsh AAHUs =	17.29
Net Change (FWP - FWOP) =	0.29

AAHU CALCULATION - OPEN WATER

Project: Robin Canal Medium SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	9,129	0.63	5791.34	
1	9228	0.63	5854.15	5822.74
10	9923	0.63	6212.09	54306.79
70	9923	0.63	6212.09	372725.49
Max=	70		AAHUs =	6183.64

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	9,129	0.63	5791.34	
1	9228	0.63	5854.15	5822.74
5	9526	0.61	5796.45	23306.34
10	9923	0.60	5917.33	29288.48
70	9923	0.58	5745.25	349877.32
Max=	70		AAHUs	5832.78

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	5832.78
B. Future Without Project Open Water AAHUs =	6183.64
Net Change (FWP - FWOP) =	-350.86

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	0.29
B. Open Water Habitat Net AAHUs =	-350.86
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	-77.74

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Saline Marsh

Project: **Robin Canal High SLR** Project Area: 9,923

Condition: Future Without Project

Variable		TY	0	TY	1	TY	10
		Value	SI	Value	SI	Value	SI
V1	% Emergent	8	0.17	7	0.16	0	0.10
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	1	0.11	1	0.11	0	0.10
V5	Salinity (ppt)	12	1.00	12	1.00	12.6	1.00
V6	Access Value	0.9600	0.96	0.9600	0.96	0.9600	0.96
	Emergent Marsh HSI	**=**	**0.34**	**EM HSI =**	**0.33**	**EM HSI =**	**0.26**
	Open Water HSI	**=**	**0.63**	**OW HSI =**	**0.63**	**OW HSI =**	**0.63**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **Robin Canal High SLR** Project Area: **9923**

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.30				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	16.2	1.00				
V6	Access Value	0.9600	0.96				
		EM HSI =	**0.26**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.63**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **Robin Canal High SLR** Project Area: **9923**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Saline Marsh

Project: **Robin Canal High SLR** Project Area: **9923**

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	8	0.17	7	0.16	4	0.14
V2	% Aquatic	0	0.30	0	0.30	0	0.30
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	1	0.11	1	0.11	0	0.10
V5	Salinity (ppt)	12	1.00	12	1.00	11.9	1.00
V6	Access Value	0.9600	0.96	0.9600	0.96	0.8900	0.90
	Emergent Marsh HSI	=	0.34	EM HSI =	0.33	EM HSI =	0.30
	Open Water HSI	=	0.63	OW HSI =	0.63	OW HSI =	0.61

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **Robin Canal High SLR** Project Area: **9923**

FWP

Variable		TY	10	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.30	0	0.30		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	12.2	1.00	14.7	1.00		
V6	Access Value	0.8880	0.90	0.7230	0.75		
		EM HSI =	0.26	EM HSI =	0.25	EM HSI =	
		OW HSI =	0.60	OW HSI =	0.54	OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **Robin Canal High SLR** Project Area: **9923**

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: Robin Canal High SLR

Future Without Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	794	0.34	269.30	
1	695	0.33	230.07	249.55
10	0	0.26	0.00	960.50
70	0	0.26	0.00	0.00
Max=	70		AAHUs =	17.29

Future With Project			Total HUs	Cummulative HUs
TY	Marsh Acres	x HSI		
0	794	0.34	269.30	
1	695	0.33	230.07	249.55
5	397	0.30	120.31	695.19
10	0	0.26	0.00	285.50
70	0	0.25	0.00	0.00
Max=	70		AAHUs	17.57

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	17.57
B. Future Without Project Emergent Marsh AAHUs =	17.29
Net Change (FWP - FWOP) =	0.29

AAHU CALCULATION - OPEN WATER

Project: Robin Canal High SLR

Future Without Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	9,129	0.63	5791.34	
1	9228	0.63	5854.15	5822.74
10	9923	0.63	6212.09	54306.79
70	9923	0.63	6212.09	372725.49
Max=	70		AAHUs =	6183.64

Future With Project			Total HUs	Cummulative HUs
TY	Water Acres	x HSI		
0	9,129	0.63	5791.34	
1	9228	0.63	5854.15	5822.74
5	9526	0.61	5792.97	23299.45
10	9923	0.60	5953.64	29369.23
70	9923	0.54	5340.17	338814.29
Max=	70		AAHUs	5675.80

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	5675.80
B. Future Without Project Open Water AAHUs =	6183.64
Net Change (FWP - FWOP) =	-507.85

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	0.29
B. Open Water Habitat Net AAHUs =	-507.85
Net Benefits= (3.5xEMAAHUs+OWAAHUs)/4.5	-112.63

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C8 Low SLR** Project Area: 3,196

Condition: Future Without Project

		TY	0	TY	1	TY	22
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	20	0.28	19	0.27	0	0.10
V2	% Aquatic	4	0.14	4	0.14	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	5	0.16	0	0.10
V5	Salinity (ppt)	8.8	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		**0.31**	**EM HSI =**	**0.30**	**EM HSI =**	**0.20**
	Open Water HSI =		**0.19**	**OW HSI =**	**0.19**	**OW HSI =**	**0.17**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **C8 Low SLR** Project Area: 3196

FWOP

		TY	70	TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	**0.20**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.17**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C8 Low SLR** Project Area: 3196

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

3/24/2013

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C8 Low SLR** Project Area: 3196

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	20	0.28	19	0.27	15	0.24
V2	% Aquatic	4	0.14	4	0.14	4	0.14
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	3	0.14
V5	Salinity (ppt)	8.8	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI	**=**	**0.31**	**EM HSI =**	**0.30**	**EM HSI =**	**0.28**
	Open Water HSI	**=**	**0.19**	**OW HSI =**	**0.19**	**OW HSI =**	**0.19**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C8 Low SLR** Project Area: 3196

FWP

Variable		TY	22	TY	24	TY	47
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		100		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	**0.20**	**EM HSI =**	**0.20**	**EM HSI =**	**0.20**
		OW HSI =	**0.17**	**OW HSI =**	**0.17**	**OW HSI =**	**0.17**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0.1

Project: **C8 Low SLR** Project Area: 3196

FWP

Variable		TY	70	TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	**0.20**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.17**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C8 Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.31	194.93	
1	607	0.30	182.58	188.73
22	0	0.20	0.00	1702.97
70	0	0.20	0.00	0.00
Max TY=	70		AAHUs =	27.02

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.31	194.93	
1	607	0.30	182.58	188.73
5	479	0.28	135.75	635.18
22	0	0.20	0.00	1040.68
70	0	0.20	0.00	0.00
Max TY=	70		AAHUs	26.64

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	26.64
B. Future Without Project Emergent Marsh AAHUs =	27.02
Net Change (FWP - FWOP) =	-0.39

AAHU CALCULATION - OPEN WATER

Project: C8 Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.19	497.58	
1	2,589	0.19	503.81	500.69
22	3,196	0.17	532.67	10942.31
70	3,196	0.17	532.67	25568.00
Max TY=	70		AAHUs =	528.73

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.19	497.58	
1	2,589	0.19	503.81	500.69
5	2,717	0.19	523.54	2054.85
22	3,196	0.17	532.67	9013.07
70	3,196	0.17	532.67	25568.00
Max TY=	70		AAHUs	530.52

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	530.52
B. Future Without Project Open Water AAHUs =	528.73
Net Change (FWP - FWOP) =	1.79

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.39
B. Open Water Habitat Net AAHUs =	1.79
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	0.22

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C8 Medium SLR** Project Area: 3,196

Condition: Future Without Project

Variable		TY	0	TY	1	TY	21
		Value	SI	Value	SI	Value	SI
V1	% Emergent	20	0.28	19	0.27	0	0.10
V2	% Aquatic	3	0.13	3	0.13	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	4	0.15	0	0.10
V5	Salinity (ppt)	8.8	1.00	8.8	1.00	9	1.00
V6	Access Value	0.8600	0.87	0.8600	0.87	0.8600	0.87
	Emergent Marsh HSI =		**0.42**	**EM HSI =**	**0.41**	**EM HSI =**	**0.25**
	Open Water HSI =		**0.31**	**OW HSI =**	**0.31**	**OW HSI =**	**0.27**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **C8 Medium SLR** Project Area: 3196

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	9.6	1.00				
V6	Access Value	0.8600	0.87				
		EM HSI =	**0.25**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.27**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C8 Medium SLR** Project Area: 3196

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C8 Medium SLR** Project Area: 3196

Condition: Future With Project

Variable		**TY**	0	**TY**	1	**TY**	5
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	20	0.28	19	0.27	15	0.24
V2	% Aquatic	3	0.13	3	0.13	3	0.13
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	4	0.15	3	0.14
V5	Salinity (ppt)	8.8	1.00	8.8	1.00	8.7	1.00
V6	Access Value	0.8600	0.87	0.8600	0.87	0.8190	0.84
	Emergent Marsh HSI =		**0.42**	**EM HSI =**	**0.41**	**EM HSI =**	**0.38**
	Open Water HSI =		**0.31**	**OW HSI =**	**0.31**	**OW HSI =**	**0.31**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C8 Medium SLR** Project Area: 3196

FWP

Variable		**TY**	21	**TY**	24	**TY**	47
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	ERR(<100)	0	ERR(<100)
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	100		0		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	9	1.00	0	1.00	0	1.00
V6	Access Value	0.8160	0.83	0.0000	0.10	0.0000	0.10
		EM HSI =	**0.25**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.27**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C8 Medium SLR** Project Area: 3196

FWP

Variable		**TY**	70	**TY**		**TY**	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	9.6	1.00				
V6	Access Value	0.7830	0.80				
		EM HSI =	**0.25**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.27**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: **C8 Medium SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.42	266.17	
1	607	0.41	248.57	257.33
21	0	0.25	0.00	2163.96
70	0	0.25	0.00	0.00
Max TY=	70		AAHUs =	34.59

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.42	266.17	
1	607	0.41	248.57	257.33
5	479	0.38	181.24	856.97
21	0	0.25	0.00	1284.84
70	0	0.25	0.00	0.00
Max TY=	70		AAHUs	34.27

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	34.27
B. Future Without Project Emergent Marsh AAHUs =	34.59
Net Change (FWP - FWOP) =	-0.32

AAHU CALCULATION - OPEN WATER

Project: **C8 Medium SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.31	804.76	
1	2,589	0.31	812.37	808.57
21	3,196	0.27	875.74	16961.54
70	3,196	0.27	875.74	42911.34
Max TY=	70		AAHUs =	866.88

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.31	804.76	
1	2,589	0.31	812.37	808.57
5	2,717	0.31	840.01	3305.15
21	3,196	0.27	864.87	13688.29
70	3,196	0.27	856.51	42173.80
Max TY=	70		AAHUs	856.80

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	856.80
B. Future Without Project Open Water AAHUs =	866.88
Net Change (FWP - FWOP) =	-10.08

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-0.32
B. Open Water Habitat Net AAHUs =	-10.08
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-3.03

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WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C8 High SLR** Project Area: 3,196

Condition: Future Without Project

Variable		TY	0	TY	1	TY	19
		Value	SI	Value	SI	Value	SI
V1	% Emergent	20	0.28	19	0.27	0	0.10
V2	% Aquatic	3	0.13	3	0.13	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	4	0.15	0	0.10
V5	Salinity (ppt)	8.8	1.00	8.8	1.00	9.3	1.00
V6	Access Value	0.8600	0.87	0.8600	0.87	0.8600	0.87
	Emergent Marsh HSI	**=**	**0.42**	**EM HSI =**	**0.41**	**EM HSI =**	**0.25**
	Open Water HSI	**=**	**0.31**	**OW HSI =**	**0.31**	**OW HSI =**	**0.27**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **C8 High SLR** Project Area: 3196

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	10.8	0.88				
V6	Access Value	0.8600	0.87				
		EM HSI =	**0.24**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.27**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C8 High SLR** Project Area: 3196

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C8 High SLR** Project Area: 3196

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	20	0.28	19	0.27	15	0.24
V2	% Aquatic	3	0.13	3	0.13	3	0.13
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.20
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		100	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	4	0.15	3	0.14
V5	Salinity (ppt)	8.8	1.00	8.8	1.00	8.8	1.00
V6	Access Value	0.8600	0.87	0.8600	0.87	0.8180	0.84
	Emergent Marsh HSI =		0.42	EM HSI =	0.41	EM HSI =	0.38
	Open Water HSI =		0.31	OW HSI =	0.31	OW HSI =	0.31

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0.2
0	0	0

Project: **C8 High SLR** Project Area: 3196

FWP

Variable		TY	19	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	9.3	1.00	10.8	0.88		
V6	Access Value	0.8130	0.83	0.7180	0.75		
		EM HSI =	0.25	EM HSI =	0.23	EM HSI =	
		OW HSI =	0.27	OW HSI =	0.25	OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **C8 High SLR** Project Area: 3196

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: **C8 High SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.42	266.17	
1	607	0.41	248.57	257.33
19	0	0.25	0.00	1947.57
70	0	0.24	0.00	0.00
Max TY=	70		AAHUs =	31.50

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	639	0.42	266.17	
1	607	0.41	248.57	257.33
5	479	0.38	181.21	856.90
19	0	0.25	0.00	1124.00
70	0	0.23	0.00	0.00
Max TY=	70		AAHUs	31.97

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	31.97
B. Future Without Project Emergent Marsh AAHUs =	31.50
Net Change (FWP - FWOP) =	0.48

AAHU CALCULATION - OPEN WATER

Project: **C8 High SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.31	804.76	
1	2,589	0.31	812.37	808.57
19	3,196	0.27	875.74	15265.38
70	3,196	0.27	847.33	43938.40
Max TY=	70		AAHUs =	857.32

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	2,557	0.31	804.76	
1	2,589	0.31	812.37	808.57
5	2,717	0.31	839.76	3304.66
19	3,196	0.27	864.12	11970.43
70	3,196	0.25	811.08	42717.47
Max TY=	70		AAHUs	840.02

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	840.02
B. Future Without Project Open Water AAHUs =	857.32
Net Change (FWP - FWOP) =	-17.30

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	0.48
B. Open Water Habitat Net AAHUs =	-17.30
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-4.46

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C5-C7, C9 Low SLR** Project Area: 8,807

Condition: Future Without Project

Variable		TY	0	TY	1	TY	53
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	0	0.10
V2	% Aquatic	15	0.24	15	0.24	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.10
	Class 2	0		0		0	
	Class 3	60		56		0	
	Class 4	40		44		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	6	0.18	0	0.10
V5	Salinity (ppt)	8	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		**0.40**	**EM HSI =**	**0.39**	**EM HSI =**	**0.20**
	Open Water HSI =		**0.24**	**OW HSI =**	**0.24**	**OW HSI =**	**0.17**

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **C5-C7, C9 Low SLR** Project Area: 8807

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	**0.20**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.17**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C5-C7, C9 Low SLR** Project Area: 8807

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C5-C7, C9 Low SLR** Project Area: 8807

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	36	0.42
V2	% Aquatic	15	0.24	15	0.24	14	0.23
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.29
	Class 2	0		0		0	
	Class 3	60		56		44	
	Class 4	40		44		56	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	6	0.18	5	0.16
V5	Salinity (ppt)	8	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
	Emergent Marsh HSI =		0.40	EM HSI =	0.39	EM HSI =	0.38
	Open Water HSI =		0.24	OW HSI =	0.24	OW HSI =	0.23

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C5-C7, C9 Low SLR** Project Area: 8807

FWP

Variable		TY	24	TY	47	TY	53
		Value	SI	Value	SI	Value	SI
V1	% Emergent	21	0.29	4	0.14	0	0.10
V2	% Aquatic	10	0.19	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.20	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		100		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	3	0.14	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	0	1.00	0	1.00
V6	Access Value	0.0000	0.10	0.0000	0.10	0.0000	0.10
		EM HSI =	0.31	EM HSI =	0.23	EM HSI =	0.20
		OW HSI =	0.21	OW HSI =	0.17	OW HSI =	0.17

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0.2	0
0	0	0.1

Project: **C5-C7, C9 Low SLR** Project Area: 8807

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	0	1.00				
V6	Access Value	0.0000	0.10				
		EM HSI =	0.20	EM HSI =		EM HSI =	
		OW HSI =	0.17	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C5-C7, C9 Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.40	1403.01	
1	3435	0.39	1351.87	1377.37
53	0	0.20	0.00	29386.50
70	0	0.20	0.00	0.00
Max TY=	70		AAHUs =	439.48

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.40	1403.01	
1	3435	0.39	1351.87	1377.37
5	3171	0.38	1203.08	5107.42
53	0	0.20	0.00	24322.88
70	0	0.20	0.00	0.00
Max TY=	70		AAHUs	440.11

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	440.11
B. Future Without Project Emergent Marsh AAHUs =	439.48
Net Change (FWP - FWOP) =	0.63

AAHU CALCULATION - OPEN WATER

Project: C5-C7, C9 Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.24	1272.21	
1	5,372	0.24	1290.22	1281.22
53	8,807	0.17	1467.83	73897.63
70	8,807	0.17	1467.83	24953.17
Max TY=	70		AAHUs =	1430.46

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.24	1272.21	
1	5,372	0.24	1290.22	1281.22
5	5,636	0.23	1321.28	5224.01
53	8,807	0.17	1467.83	68658.02
70	8,807	0.17	1467.83	24953.17
Max TY=	70		AAHUs	1430.23

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1430.23
B. Future Without Project Open Water AAHUs =	1430.46
Net Change (FWP - FWOP) =	-0.22

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	0.63
B. Open Water Habitat Net AAHUs =	-0.22
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	0.39

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WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C5-C7, C9 Medium SLR** Project Area: 8,807

Condition: Future Without Project

Variable		TY	0	TY	1	TY	47
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	0	0.10
V2	% Aquatic	10	0.19	10	0.19	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.10
	Class 2	0		0		0	
	Class 3	60		56		0	
	Class 4	40		44		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	6	0.18	0	0.10
V5	Salinity (ppt)	8	1.00	8	1.00	8.5	1.00
V6	Access Value	0.8700	0.88	0.8700	0.88	0.8700	0.88
	Emergent Marsh HSI =		**0.56**	**EM HSI =**	**0.56**	**EM HSI =**	**0.25**
	Open Water HSI =		**0.38**	**OW HSI =**	**0.38**	**OW HSI =**	**0.27**

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **C5-C7, C9 Medium SLR** Project Area: 8807

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	8.8	1.00				
V6	Access Value	0.8700	0.88				
		EM HSI =	**0.25**	**EM HSI =**		**EM HSI =**	
		OW HSI =	**0.27**	**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C5-C7, C9 Medium SLR** Project Area: 8807

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations

Interspersion

0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C5-C7, C9 Medium SLR** Project Area: 8807

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	36	0.42
V2	% Aquatic	10	0.19	10	0.19	11	0.20
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.29
	Class 2	0		0		0	
	Class 3	60		56		44	
	Class 4	40		44		56	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	6	0.18	5	0.16
V5	Salinity (ppt)	8	1.00	8	1.00	7.9	1.00
V6	Access Value	0.8700	0.88	0.8700	0.88	0.8010	0.82
	Emergent Marsh HSI =		0.56	EM HSI =	0.56	EM HSI =	0.53
	Open Water HSI =		0.38	OW HSI =	0.38	OW HSI =	0.38

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C5-C7, C9 Medium SLR** Project Area: 8807

FWP

Variable		TY	24	TY	47	TY	70
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		100		100	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)	0	1.00	8.6	1.00	8.9	1.00
V6	Access Value	0.0000	0.10	0.7800	0.80	0.7410	0.77
		EM HSI =		EM HSI =	0.25	EM HSI =	0.25
		OW HSI =		OW HSI =	0.27	OW HSI =	0.26

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0.1	0.1

Project: **C5-C7, C9 Medium SLR** Project Area: 8807

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C5-C7, C9 Medium SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.56	1981.85	
1	3435	0.56	1907.75	1944.69
70	0	0.25	0.00	53785.23
Max TY=	70		AAHUs =	796.14

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.56	1981.85	
1	3435	0.56	1907.75	1944.69
5	3171	0.53	1671.76	7154.05
70	0	0.25	0.00	44695.57
Max TY=	70		AAHUs	768.49

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	768.49
B. Future Without Project Emergent Marsh AAHUs =	796.14
Net Change (FWP - FWOP) =	-27.65

AAHU CALCULATION - OPEN WATER

Project: C5-C7, C9 Medium SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.38	2029.63	
1	5,372	0.38	2060.24	2044.94
70	8,807	0.27	2419.92	158861.17
Max TY=	70		AAHUs =	2298.66

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.38	2029.63	
1	5,372	0.38	2060.24	2044.94
5	5,636	0.38	2143.95	8408.93
70	8,807	0.26	2330.16	149387.28
Max TY=	70		AAHUs	2283.45

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	2283.45
B. Future Without Project Open Water AAHUs =	2298.66
Net Change (FWP - FWOP) =	-15.21

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-27.65
B. Open Water Habitat Net AAHUs =	-15.21
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-24.20

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Brackish Marsh

Project: **C5-C7, C9 High SLR** Project Area: 8,807

Condition: Future Without Project

Variable		TY	0	TY	1	TY	37
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	0	0.10
V2	% Aquatic	10	0.19	10	0.19	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.10
	Class 2	0		0		0	
	Class 3	60		56		0	
	Class 4	40		44		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	6	0.18	6	0.18	0	0.10
V5	Salinity (ppt)	8	1.00	8	1.00	9.2	1.00
V6	Access Value	0.8700	0.88	0.8700	0.88	0.8700	0.88
	Emergent Marsh HSI =		0.56	**EM HSI =**	0.56	**EM HSI =**	0.25
	Open Water HSI =		0.38	**OW HSI =**	0.38	**OW HSI =**	0.27

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1

Project: **C5-C7, C9 High SLR** Project Area: 8807

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)	10.3	0.96				
V6	Access Value	0.8700	0.88				
		EM HSI =	0.25	**EM HSI =**		**EM HSI =**	
		OW HSI =	0.27	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0

Project: **C5-C7, C9 High SLR** Project Area: 8807

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: **C5-C7, C9 High SLR** Project Area: 8807

Condition: Future With Project

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	40	0.46	39	0.45	35	0.42
V2	% Aquatic	10	0.19	10	0.19	8	0.17
V3	Interspersion	%		%		%	
	Class 1	0	0.32	0	0.31	0	0.28
	Class 2	0		0		0	
	Class 3	60		56		40	
	Class 4	40		44		60	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	6	0.18	6	0.18	5	0.16
V5	Salinity (ppt)	8	1.00	8	1.00	8	1.00
V6	Access Value	0.8700	0.88	0.8700	0.88	0.8000	0.82
	Emergent Marsh HSI =		0.56	EM HSI =	0.56	EM HSI =	0.52
	Open Water HSI =		0.38	OW HSI =	0.38	OW HSI =	0.36

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0

Project: **C5-C7, C9 High SLR** Project Area: 8807

FWP

Variable		TY	37	TY	70	TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)	9	1.00	9.8	1.00		
V6	Access Value	0.7550	0.78	0.6330	0.67		
		EM HSI =	0.25	EM HSI =	0.24	EM HSI =	
		OW HSI =	0.27	OW HSI =	0.26	OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0

Project: **C5-C7, C9 High SLR** Project Area: 8807

FWP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
V6	Access Value						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

AAHU CALCULATION - EMERGENT MARSH

Project: C5-C7, C9 High SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.56	1981.85	
1	3435	0.56	1907.75	1944.69
37	0	0.25	0.00	28061.86
70	0	0.25	0.00	0.00
Max TY=	70		AAHUs =	428.67

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3523	0.56	1981.85	
1	3435	0.56	1907.75	1944.69
5	3082	0.52	1602.43	7012.00
37	0	0.25	0.00	21155.05
70	0	0.24	0.00	0.00
Max TY=	70		AAHUs	430.17

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	430.17
B. Future Without Project Emergent Marsh AAHUs =	428.67
Net Change (FWP - FWOP) =	1.50

AAHU CALCULATION - OPEN WATER

Project: C5-C7, C9 High SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.38	2029.63	
1	5,372	0.38	2060.24	2044.94
37	8,807	0.27	2419.92	82884.09
70	8,807	0.27	2390.56	79372.86
Max TY=	70		AAHUs =	2347.17

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	5,284	0.38	2029.63	
1	5,372	0.38	2060.24	2044.94
5	5,725	0.36	2042.94	8212.65
37	8,807	0.27	2340.28	71629.28
70	8,807	0.26	2248.51	75715.07
Max TY=	70		AAHUs	2251.46

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	2251.46
B. Future Without Project Open Water AAHUs =	2347.17
Net Change (FWP - FWOP) =	-95.71

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	1.50
B. Open Water Habitat Net AAHUs =	-95.71
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-25.50

3/24/2013

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **C1-C4 Low SLR**

Project Area:	10,301
% Fresh	0
% Intermediate	100

Condition: Future Without Project

Variable		TY	0	TY	1	TY	46
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	30	0.37	29	0.36	0	0.10
V2	% Aquatic	12	0.21	12	0.21	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.10
	Class 2	0		0		0	
	Class 3	20		16		0	
	Class 4	80		84		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	5	0.16	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.10	0	1.00	0	1.00
	intermediate	7.1		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
	Emergent Marsh HSI =		0.30	**EM HSI =**	0.39	**EM HSI =**	0.21
	Open Water HSI =		0.20	**OW HSI =**	0.26	**OW HSI =**	0.18

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.10	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **C1-C4 Low SLR**

FWOP

Variable		TY	70	TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	1.00				
	intermediate	0					
V6	Access Value						
	fresh	0.0000	0.20				
	intermediate	0.0000					
		EM HSI =	0.21	**EM HSI =**		**EM HSI =**	
		OW HSI =	0.18	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
1.00		
Access Value		
0.30		
0.20		

Project: **C1-C4 Low SLR**

FWOP

Variable		TY		TY		TY	
		Value	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

Fresh/Intermediate Marsh

Project: **C1-C4 Low SLR**

Condition: Future With Project

Project Area:	10,301
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	30	0.37	29	0.36	27	0.34
V2	% Aquatic	12	0.21	12	0.21	11	0.20
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.22
	Class 2	0		0		0	
	Class 3	20		16		8	
	Class 4	80		84		92	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	4	0.15
V5	Salinity (ppt)						
	fresh	0	0.10	0	1.00	0	1.00
	intermediate	7.1		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0		0.0000		0.0000	
	Emergent Marsh HSI =		0.30	EM HSI =	0.39	EM HSI =	0.38
	Open Water HSI =		0.20	OW HSI =	0.26	OW HSI =	0.26

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.10	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **C1-C4 Low SLR**

FWP

Variable		TY	24	TY	46	TY	47
		Value	SI	Value	SI	Value	SI
V1	% Emergent	14	0.23	0	0.10	0	0.10
V2	% Aquatic	5	0.15	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.20	0	0.10	0	0.10
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	100		0		0	
	Class 5	0		100		100	
V4	%OW <= 1.5ft	1	0.11	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	0	1.00	0	1.00	0	1.00
	intermediate	0		0		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.20	0.0000	0.20
	intermediate	0.0000		0.0000		0.0000	
		EM HSI =	0.31	EM HSI =	0.21	EM HSI =	0.21
		OW HSI =	0.22	OW HSI =	0.18	OW HSI =	0.18

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0.2	0	0
0	0.1	0.1
Salinity		
1.00	1.00	1.00
1.00	1.00	1.00
Access Value		
0.30	0.30	0.30
0.20	0.20	0.20

Project: **C1-C4 Low SLR**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	1.00				
	intermediate	0					
V6	Access Value						
	fresh	0.0000	0.20				
	intermediate	0.0000					
		EM HSI =	0.21	EM HSI =		EM HSI =	
		OW HSI =	0.18	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
1.00		
Access Value		
0.30		
0.20		

AAHU CALCULATION - EMERGENT MARSH

Project: C1-C4 Low SLR

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3090	0.30	919.31	
1	2987	0.39	1168.95	1045.74
46	0	0.21	0.00	22228.19
70	0	0.21	0.00	0.00
Max=	70		AAHUs =	332.48

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3090	0.30	919.31	
1	2987	0.39	1168.95	1045.74
5	2781	0.38	1053.86	4443.93
46	0	0.21	0.00	18384.51
70	0	0.21	0.00	0.00
Max=	70		AAHUs	341.06

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	341.06
B. Future Without Project Emergent Marsh AAHUs =	332.48
Net Change (FWP - FWOP) =	8.58

AAHU CALCULATION - OPEN WATER

Project: C1-C4 Low SLR

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	7,211	0.20	1420.27	
1	7,314	0.26	1923.82	1670.91
46	10,301	0.18	1868.42	87154.66
70	10,301	0.18	1868.42	44842.18
Max=	70		AAHUs =	1909.54

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	7,211	0.20	1420.27	
1	7,314	0.26	1923.82	1670.91
5	7,520	0.26	1923.52	7695.67
46	10,301	0.18	1868.42	79148.70
70	10,301	0.18	1868.42	44842.18
Max=	70		AAHUs	1905.11

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1905.11
B. Future Without Project Open Water AAHUs =	1909.54
Net Change (FWP - FWOP) =	-4.43

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	8.58
B. Open Water Habitat Net AAHUs =	-4.43
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	4.38

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **C1-C4 Medium SLR**

Condition: Future Without Project

Project Area:	10,301
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	42
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	30	0.37	29	0.36	0	0.10
V2	% Aquatic	12	0.21	12	0.21	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.10
	Class 2	0		0		0	
	Class 3	20		16		0	
	Class 4	80		84		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	5	0.16	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.10	0	0.10	0	0.10
	intermediate	7.1		7.1		7.3	
V6	Access Value						
	fresh	0.0000	0.90	0.0000	0.90	0.0000	0.90
	intermediate	0.8700		0.8700		0.8700	
	Emergent Marsh HSI =		0.37	**EM HSI =**	0.36	**EM HSI =**	0.13
	Open Water HSI =		0.27	**OW HSI =**	0.27	**OW HSI =**	0.16

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.10	0.10	0.10
Access Value		
0.30	0.30	0.30
0.90	0.90	0.90

Project: **C1-C4 Medium SLR**

FWOP

		TY	70	TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.10				
	intermediate	7.4					
V6	Access Value						
	fresh	0.0000	0.90				
	intermediate	0.8700					
		EM HSI =	0.13	**EM HSI =**		**EM HSI =**	
		OW HSI =	0.16	**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.10		
Access Value		
0.30		
0.90		

Project: **C1-C4 Medium SLR**

FWOP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **C1-C4 Medium SLR**

Condition: Future With Project

Project Area:	10,301
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	5
		Value	SI	Value	SI	Value	SI
V1	% Emergent	30	0.37	29	0.36	27	0.34
V2	% Aquatic	12	0.21	12	0.21	10	0.19
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.22
	Class 2	0		0		0	
	Class 3	20		16		8	
	Class 4	80		84		92	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	4	0.15
V5	Salinity (ppt)						
	fresh	0	0.10	0	0.10	0	0.10
	intermediate	7.1		7.1		7	
V6	Access Value						
	fresh	0.0000	0.90	0.0000	0.90	0.0000	0.84
	intermediate	0.87		0.8700		0.8010	
	Emergent Marsh HSI =		0.37	EM HSI =	0.36	EM HSI =	0.34
	Open Water HSI =		0.27	OW HSI =	0.27	OW HSI =	0.25

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.10	0.10	0.10
Access Value		
0.30	0.30	0.30
0.90	0.90	0.84

Project: **C1-C4 Medium SLR**

FWP

Variable		TY	24	TY	42	TY	47
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10	0	0.10	0	0.10
V2	% Aquatic	0	0.10	0	0.10	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	ERR(<100)	0	0.10	0	ERR(<100)
	Class 2	0		0		0	
	Class 3	0		0		0	
	Class 4	0		0		0	
	Class 5	0		100		0	
V4	%OW <= 1.5ft	0	0.10	0	0.10	0	0.10
V5	Salinity (ppt)						
	fresh	0	1.00	0	0.10	0	1.00
	intermediate	0		7.2		0	
V6	Access Value						
	fresh	0.0000	0.20	0.0000	0.83	0.0000	0.20
	intermediate	0.0000		0.7860		0.0000	
		EM HSI =		EM HSI =	0.13	EM HSI =	
		OW HSI =		OW HSI =	0.15	OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0.1	0
Salinity		
1.00	1.00	1.00
1.00	0.10	1.00
Access Value		
0.30	0.30	0.30
0.20	0.83	0.20

Project: **C1-C4 Medium SLR**

FWP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.10				
	intermediate	7.4					
V6	Access Value						
	fresh	0.0000	0.79				
	intermediate	0.7410					
		EM HSI =	0.13	EM HSI =		EM HSI =	
		OW HSI =	0.15	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.10		
Access Value		
0.30		
0.79		

AAHU CALCULATION - EMERGENT MARSH

Project: **C1-C4 Medium SLR**

Future Without Project			Total HUs	Cummulative HUs
TY	**Marsh Acres**	**x HSI**		
0	3090	0.37	1147.20	
1	2987	0.36	1086.07	1116.50
42	0	0.13	0.00	17584.47
70	0	0.13	0.00	0.00
Max=	70		AAHUs =	267.16

Future With Project			Total HUs	Cummulative HUs
TY	**Marsh Acres**	**x HSI**		
0	3090	0.37	1147.20	
1	2987	0.36	1086.07	1116.50
5	2781	0.34	959.13	4087.84
42	0	0.13	0.00	14107.92
70	0	0.13	0.00	0.00
Max=	70		AAHUs	275.89

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	275.89
B. Future Without Project Emergent Marsh AAHUs =	267.16
Net Change (FWP - FWOP) =	8.73

AAHU CALCULATION - OPEN WATER

Project: **C1-C4 Medium SLR**

Future Without Project			Total HUs	Cummulative HUs
TY	**Water Acres**	**x HSI**		
0	7,211	0.27	1945.71	
1	7,314	0.27	1969.17	1957.45
42	10,301	0.16	1615.07	75772.04
70	10,301	0.16	1615.07	45221.86
Max=	70		AAHUs =	1756.45

Future With Project			Total HUs	Cummulative HUs
TY	**Water Acres**	**x HSI**		
0	7,211	0.27	1945.71	
1	7,314	0.27	1969.17	1957.45
5	7,520	0.25	1868.60	7678.39
42	10,301	0.15	1588.31	65569.88
70	10,301	0.15	1573.30	44262.60
Max=	70		AAHUs	1706.69

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1706.69
B. Future Without Project Open Water AAHUs =	1756.45
Net Change (FWP - FWOP) =	-49.76

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	8.73
B. Open Water Habitat Net AAHUs =	-49.76
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-10.14

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **C1-C4 High SLR**

Condition: Future Without Project

Project Area:	10,301
% Fresh	0
% Intermediate	100

Variable		TY	0	TY	1	TY	34
		Value	SI	Value	SI	Value	SI
V1	% Emergent	30	0.37	29	0.36	0	0.10
V2	% Aquatic	12	0.21	12	0.21	0	0.10
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.10
	Class 2	0		0		0	
	Class 3	20		16		0	
	Class 4	80		84		0	
	Class 5	0		0		100	
V4	%OW <= 1.5ft	5	0.16	5	0.16	0	0.10
V5	Salinity (ppt)						
	fresh	0	0.10	0	0.10	0	0.10
	intermediate	7.1		7.1		7.7	
V6	Access Value						
	fresh	0.0000	0.90	0.0000	0.90	0.0000	0.90
	intermediate	0.8700		0.8700		0.8700	
	Emergent Marsh HSI =		0.37	EM HSI =	0.36	EM HSI =	0.13
	Open Water HSI =		0.27	OW HSI =	0.27	OW HSI =	0.16

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0
0.2	0.2	0
0	0	0.1
Salinity		
1.00	1.00	1.00
0.10	0.10	0.10
Access Value		
0.30	0.30	0.30
0.90	0.90	0.90

Project: **C1-C4 High SLR**

FWOP

Variable		TY	70	TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent	0	0.10				
V2	% Aquatic	0	0.10				
V3	Interspersion	%		%		%	
	Class 1	0	0.10				
	Class 2	0					
	Class 3	0					
	Class 4	0					
	Class 5	100					
V4	%OW <= 1.5ft	0	0.10				
V5	Salinity (ppt)						
	fresh	0	0.10				
	intermediate	8.3					
V6	Access Value						
	fresh	0.0000	0.90				
	intermediate	0.8700					
		EM HSI =	0.13	EM HSI =		EM HSI =	
		OW HSI =	0.16	OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0	0
Salinity		
1.00		
0.10		
Access Value		
0.30		
0.90		

Project: **C1-C4 High SLR**

FWOP

Variable		TY		TY		TY	
		Value	SI	Value	SI	Value	SI
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		EM HSI =		EM HSI =	
		OW HSI =		OW HSI =		OW HSI =	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: **C1-C4 High SLR**

Condition: Future With Project

Project Area:	10,301
% Fresh	0
% Intermediate	100

		TY	0	TY	1	TY	5
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	30	0.37	29	0.36	26	0.33
V2	% Aquatic	12	0.21	12	0.21	10	0.19
V3	Interspersion	%		%		%	
	Class 1	0	0.24	0	0.23	0	0.22
	Class 2	0		0		0	
	Class 3	20		16		8	
	Class 4	80		84		92	
	Class 5	0		0		0	
V4	%OW <= 1.5ft	5	0.16	5	0.16	4	0.15
V5	Salinity (ppt)						
	fresh	0	0.10	0	0.10	0	0.10
	intermediate	7.1		7.1		7.1	
V6	Access Value						
	fresh	0.0000	0.90	0.0000	0.90	0.0000	0.84
	intermediate	0.87		0.8700		0.8000	
	Emergent Marsh HSI =		0.37	**EM HSI =**	0.36	**EM HSI =**	0.34
	Open Water HSI =		0.27	**OW HSI =**	0.27	**OW HSI =**	0.25

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0.4	0.4	0.4
0.2	0.2	0.2
0	0	0
Salinity		
1.00	1.00	1.00
0.10	0.10	0.10
Access Value		
0.30	0.30	0.30
0.90	0.90	0.84

Project: **C1-C4 High SLR**

FWP

		TY	34	TY	70	TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent	0	0.10	0	0.10		
V2	% Aquatic	0	0.10	0	0.10		
V3	Interspersion	%		%		%	
	Class 1	0	0.10	0	0.10		
	Class 2	0		0			
	Class 3	0		0			
	Class 4	0		0			
	Class 5	100		100			
V4	%OW <= 1.5ft	0	0.10	0	0.10		
V5	Salinity (ppt)						
	fresh	0	0.10	0	0.10		
	intermediate	7.7		8.2			
V6	Access Value						
	fresh	0.0000	0.81	0.0000	0.71		
	intermediate	0.7660		0.6330			
		EM HSI =	0.13	**EM HSI =**	0.13	**EM HSI =**	
		OW HSI =	0.15	**OW HSI =**	0.15	**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0.1	0.1	0
Salinity		
1.00	1.00	
0.10	0.10	
Access Value		
0.30	0.30	
0.81	0.71	

Project: **C1-C4 High SLR**

FWP

		TY		TY		TY	
Variable		**Value**	**SI**	**Value**	**SI**	**Value**	**SI**
V1	% Emergent						
V2	% Aquatic						
V3	Interspersion	%		%		%	
	Class 1						
	Class 2						
	Class 3						
	Class 4						
	Class 5						
V4	%OW <= 1.5ft						
V5	Salinity (ppt)						
	fresh						
	intermediate						
V6	Access Value						
	fresh						
	intermediate						
		EM HSI =		**EM HSI =**		**EM HSI =**	
		OW HSI =		**OW HSI =**		**OW HSI =**	

Intermediate Calculations		
Interspersion		
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
Salinity		
Access Value		

AAHU CALCULATION - EMERGENT MARSH

Project: **C1-C4 High SLR**

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3090	0.37	1147.20	
1	2987	0.36	1086.07	1116.50
34	0	0.13	0.00	14153.36
70	0	0.13	0.00	0.00
Max=	70		AAHUs =	218.14

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	3090	0.37	1147.20	
1	2987	0.36	1086.07	1116.50
5	2678	0.34	905.30	3977.48
34	0	0.13	0.00	10466.40
70	0	0.13	0.00	0.00
Max=	70		AAHUs	222.29

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	222.29
B. Future Without Project Emergent Marsh AAHUs =	218.14
Net Change (FWP - FWOP) =	4.15

AAHU CALCULATION - OPEN WATER

Project: **C1-C4 High SLR**

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	7,211	0.27	1945.71	
1	7,314	0.27	1969.17	1957.45
34	10,301	0.16	1615.07	60987.25
70	10,301	0.16	1615.07	58142.39
Max=	70		AAHUs =	1729.82

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	7,211	0.27	1945.71	
1	7,314	0.27	1969.17	1957.45
5	7,623	0.25	1893.80	7730.23
34	10,301	0.15	1581.70	51622.95
70	10,301	0.15	1535.07	56101.99
Max=	70		AAHUs	1677.32

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	1677.32
B. Future Without Project Open Water AAHUs =	1729.82
Net Change (FWP - FWOP) =	-52.49

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	4.15
B. Open Water Habitat Net AAHUs =	-52.49
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	-14.12

Appendix G

MAPBOOK

Legend

☒ PumpStations

Centerline

▨ Right of Way

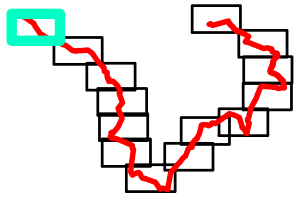
NWR or WMA

▨ Mitigation Area

Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative



Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

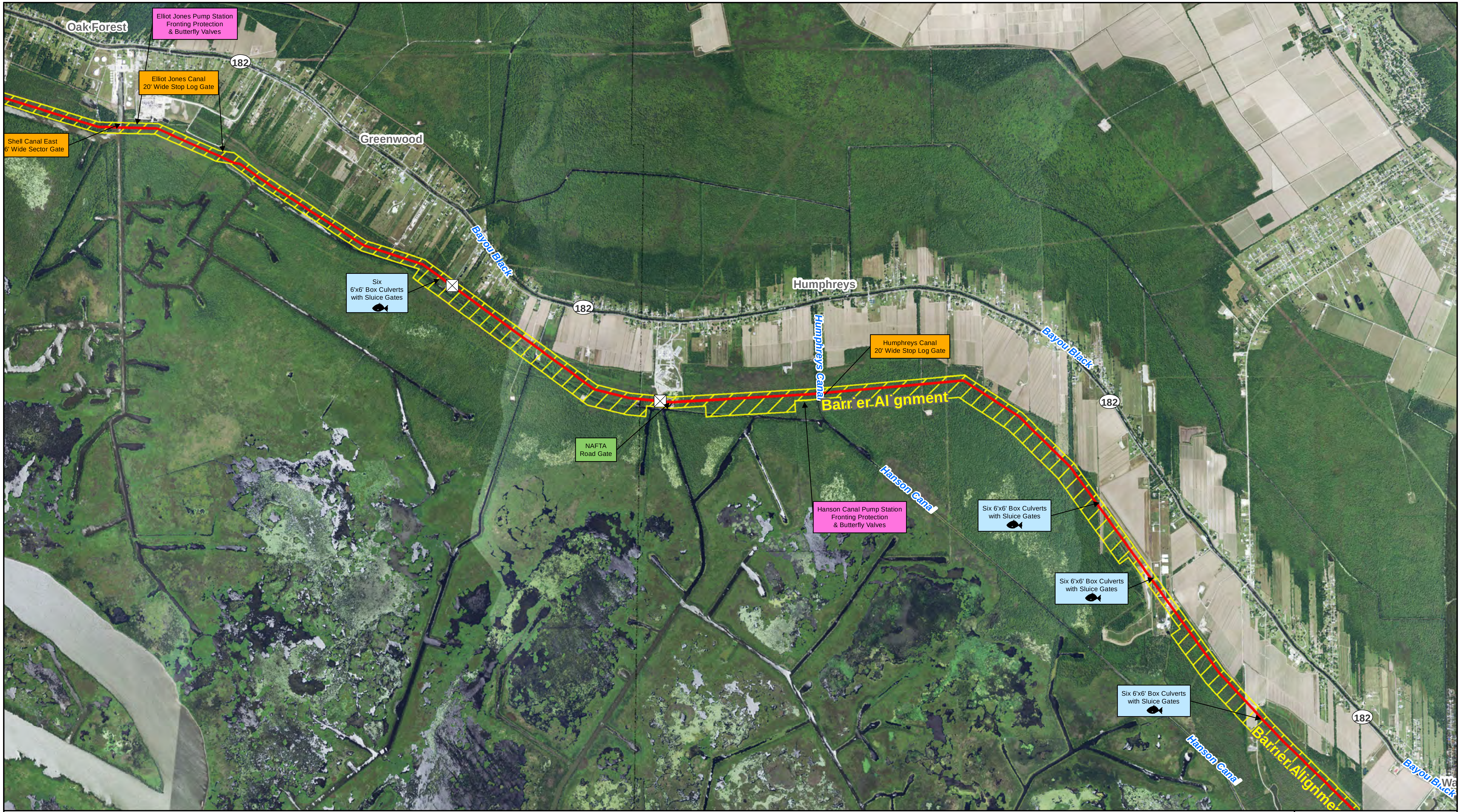
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 01 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



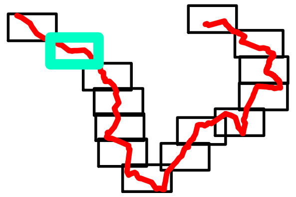
Legend

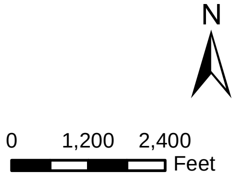
- ☒ PumpStations
- 🟥 Centerline
- ▨ Right of Way
- ░ NWR or WMA
- ▨ Mitigation Area
- ░ Borrow Pits
- 1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

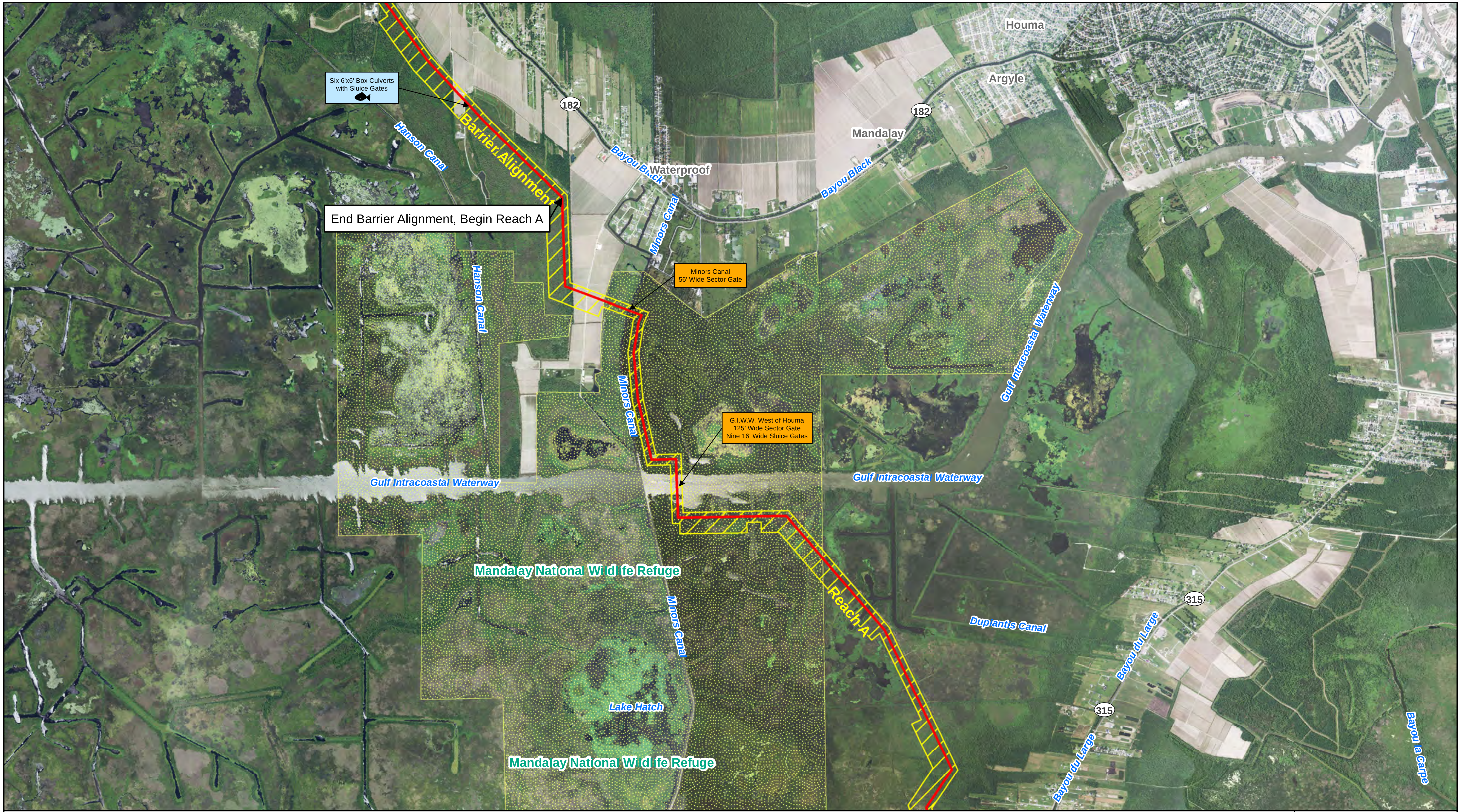
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes





GEC
Gulf Engineers & Consultants

Figure: 02 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

☒ PumpStations

— Centerline

▨ Right of Way

░ NWR or WMA

▨ Mitigation Area

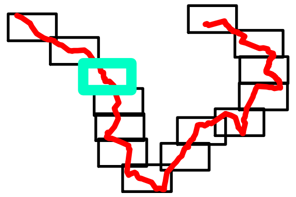
░ Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

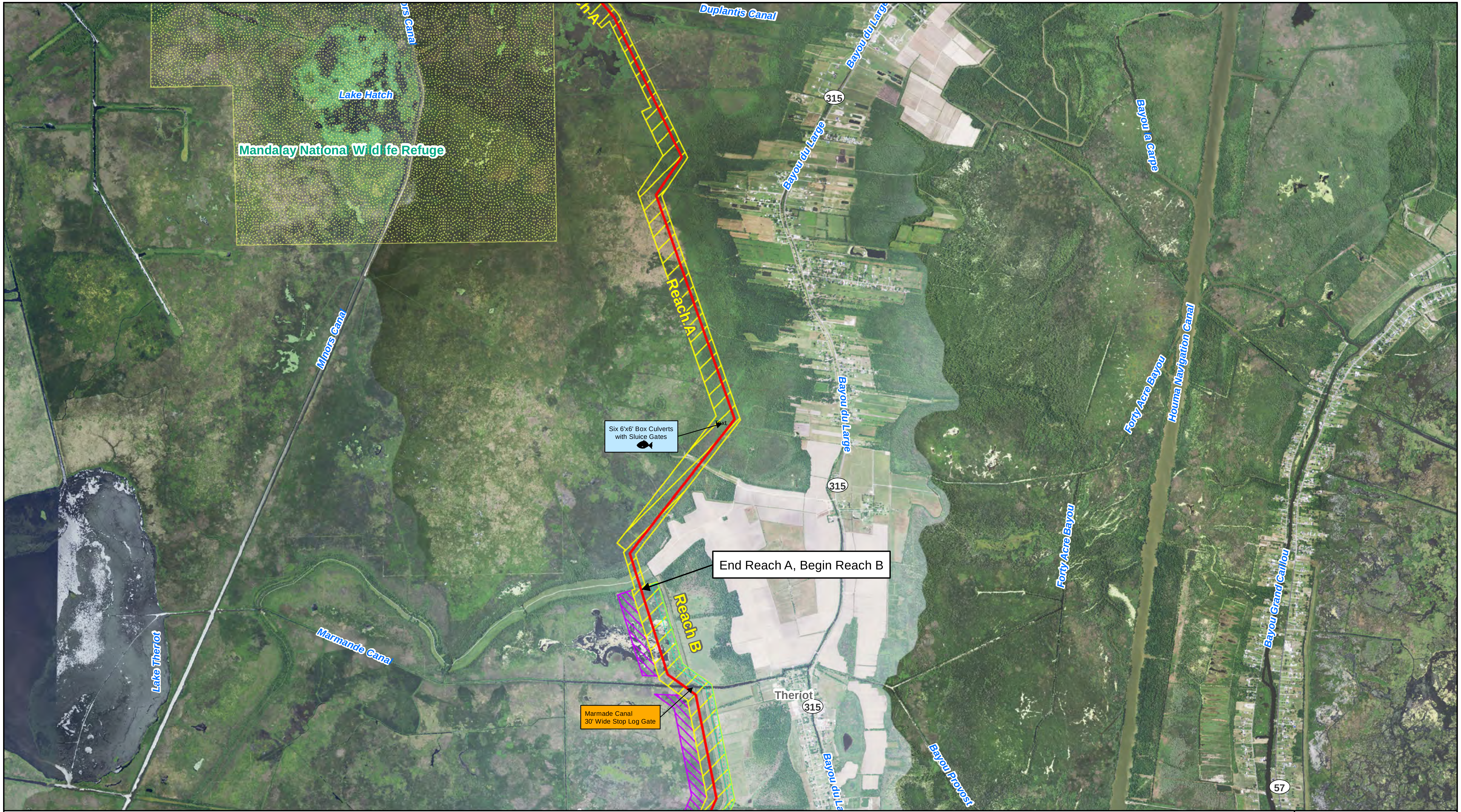


N

0 1,200 2,400
Feet

Gulf Engineers & Consultants

Figure: 03 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

☒ PumpStations

▬ Centerline

▨ Right of Way

▨ NWR or WMA

▨ Mitigation Area

▨ Borrow Pits

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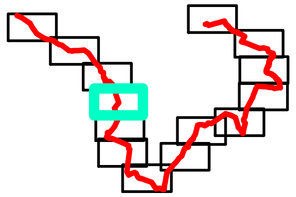
1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

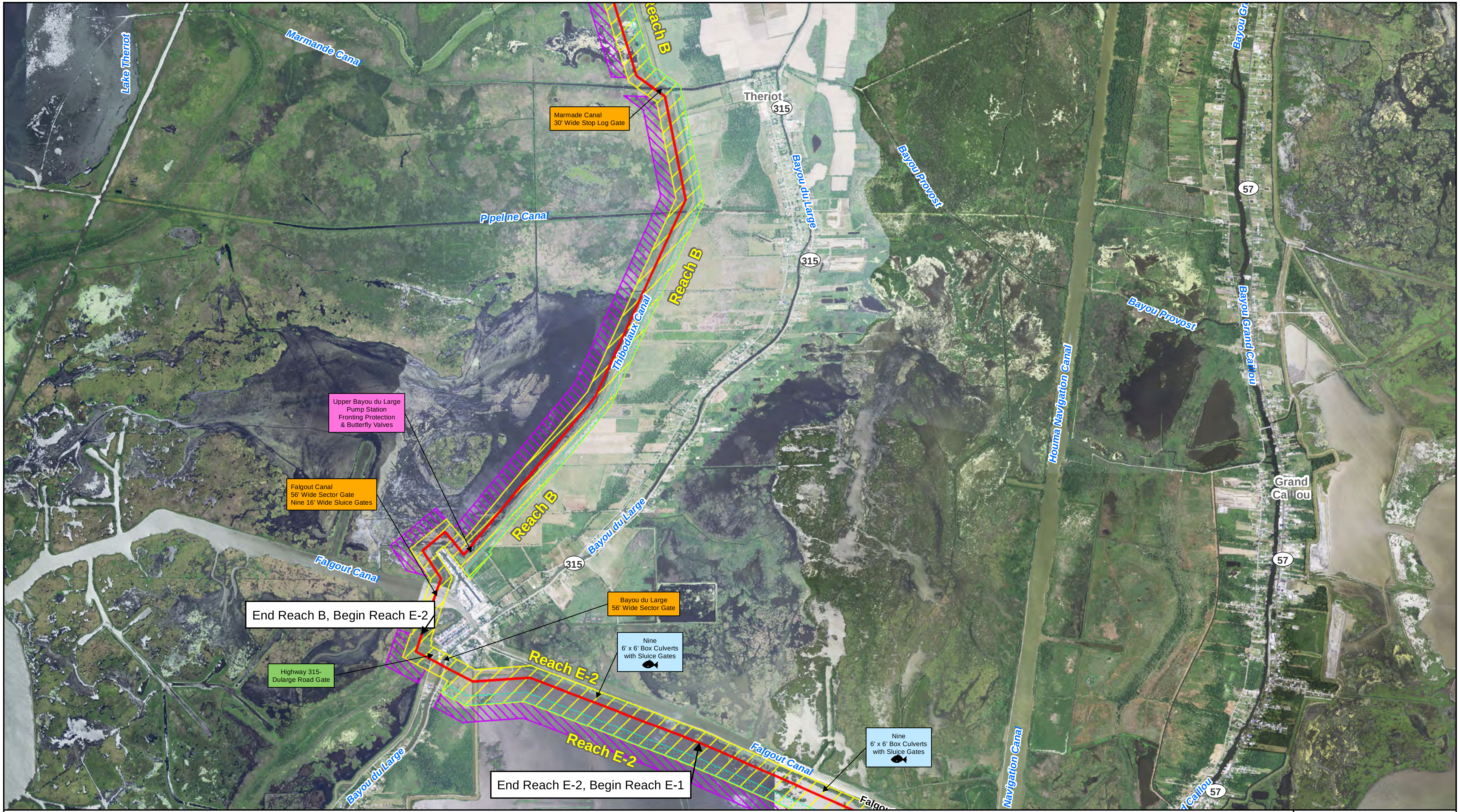


N

0 1,200 2,400
Feet

GEC
Gulf Engineers & Consultants

Figure: 04 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

- ☒ PumpStations
- 🟥 Centerline
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- ▨ NWR or WMA
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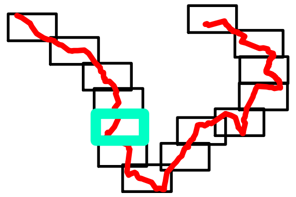
1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

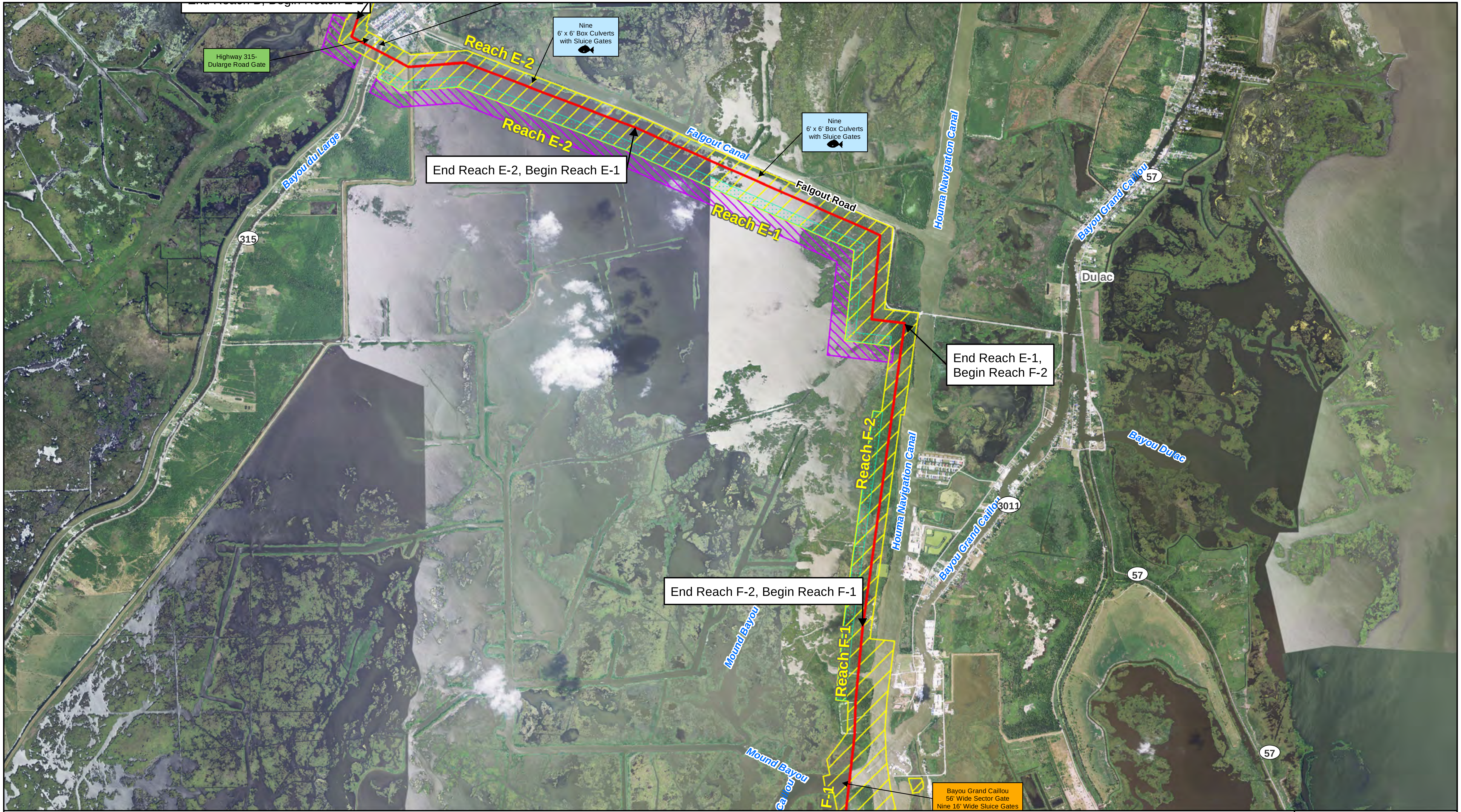


N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 05 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

- ☒ PumpStations
- — Centerline
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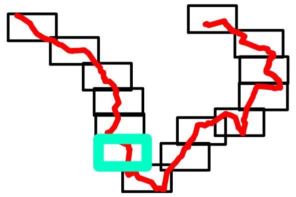

N

0 1,200 2,400 Feet

Gulf Engineers & Consultants

Figure: 06 of 14
Date: June 2012
Scale: 1:36,000
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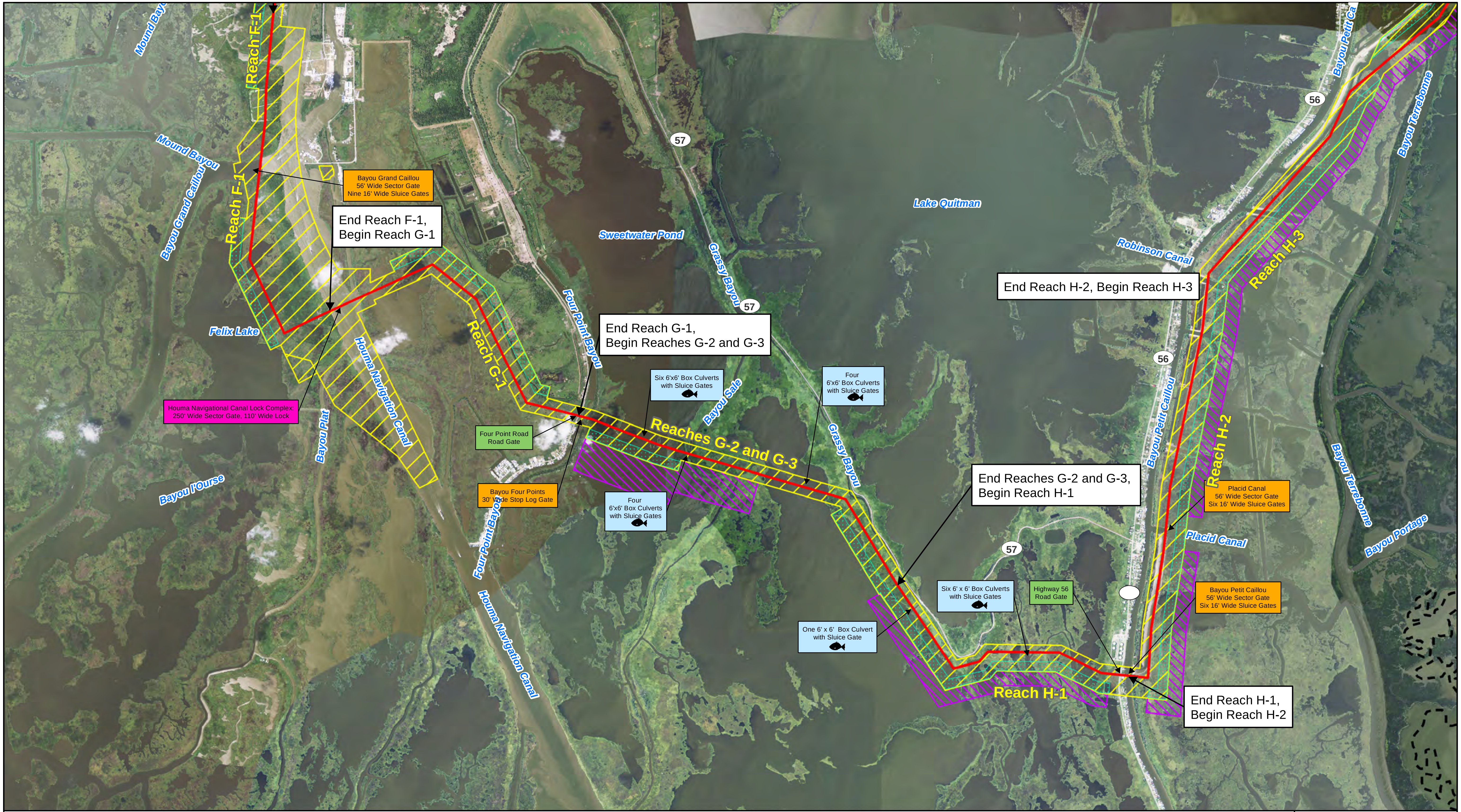

Legend

☒ PumpStations

Centerline

▨ Right of Way

NWR or WMA

▨ Mitigation Area

Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

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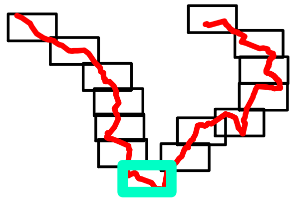
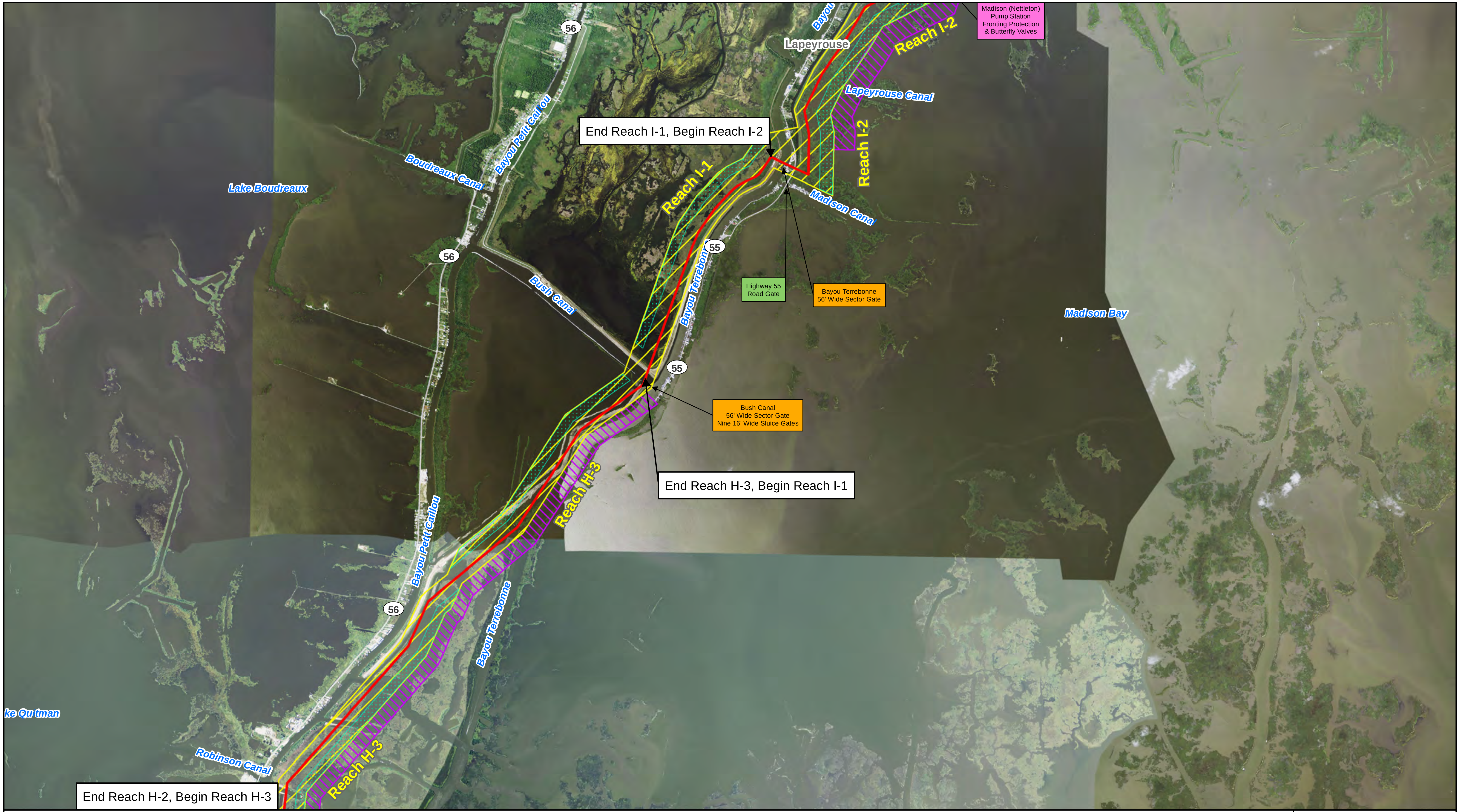


N

0 1,200 2,400
Feet

Gulf Engineers & Consultants

Figure: 07 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

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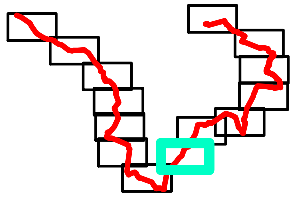
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

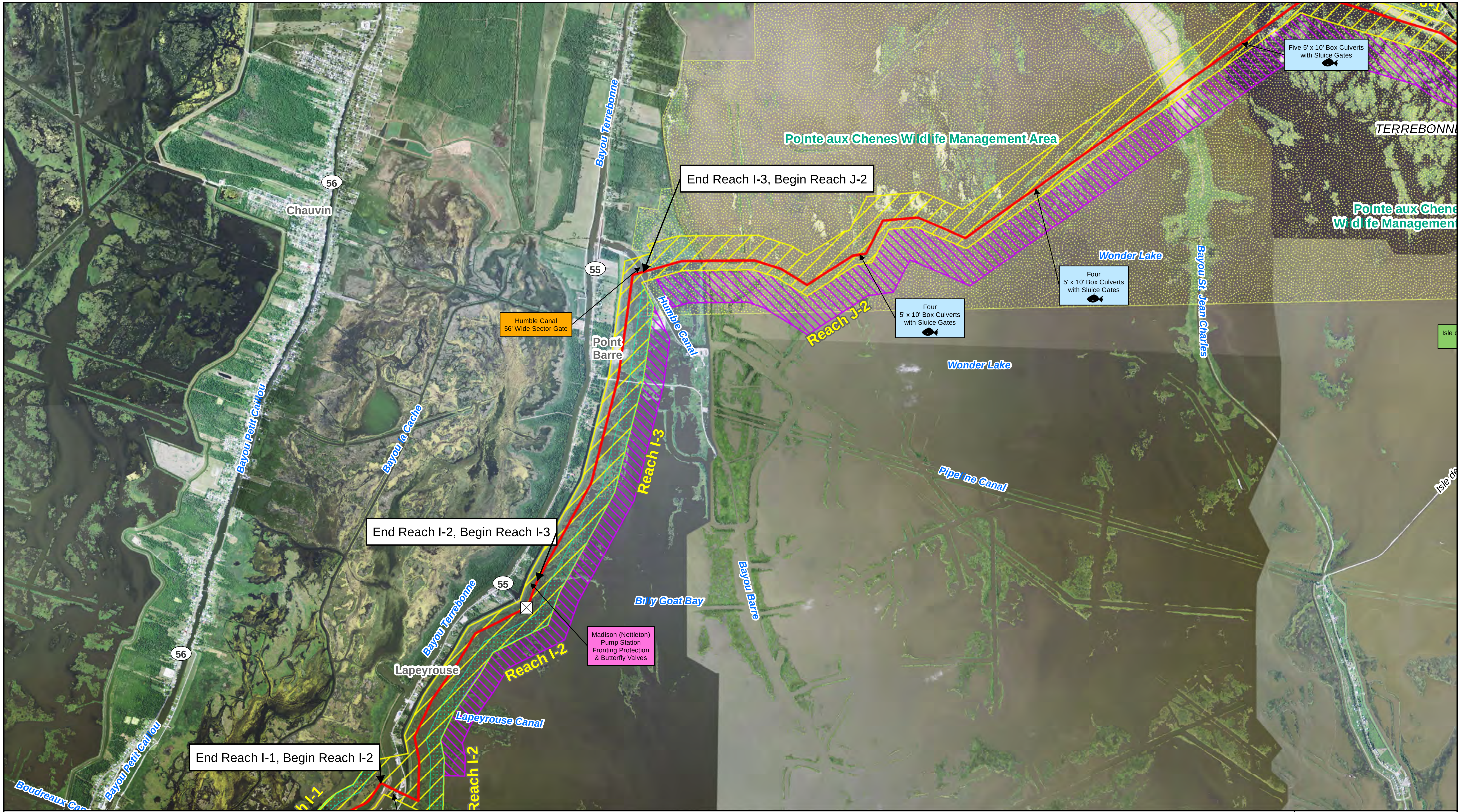


N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 08 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

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- ▨ Right of Way
- ░ NWR or WMA
- ▨ Mitigation Area
- ░ Borrow Pits
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Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

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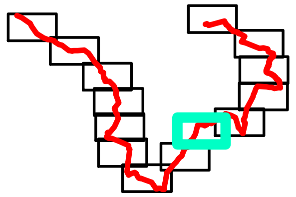
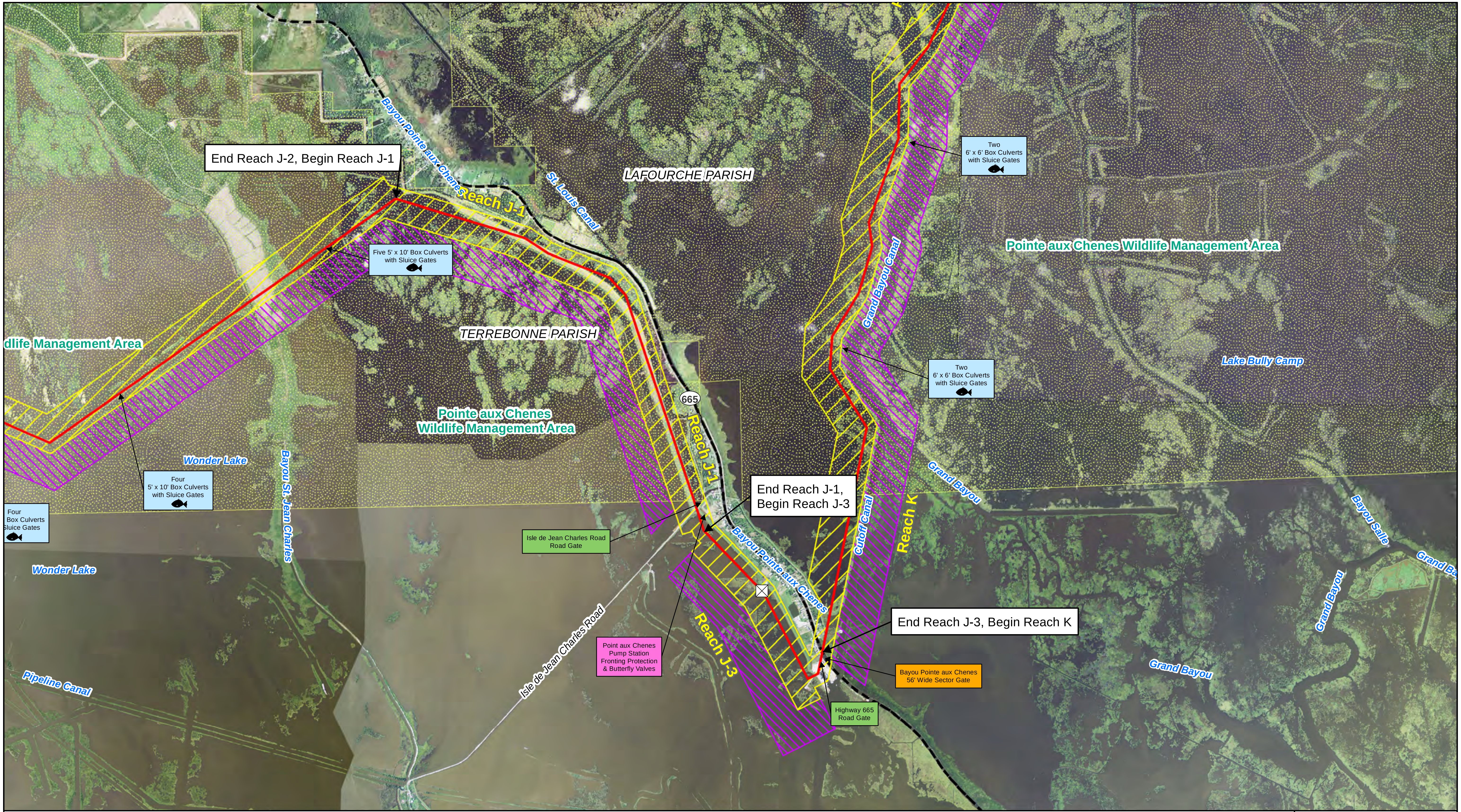


N

0 1,200 2,400
Feet

GEC
Gulf Engineers & Consultants

Figure: 09 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

- ☒ PumpStations
- Centerline
- ▨ Right of Way
- NWR or WMA
- ▨ Mitigation Area
- Borrow Pits
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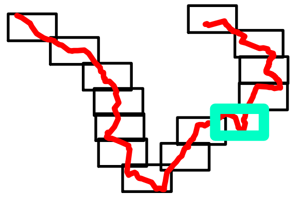
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

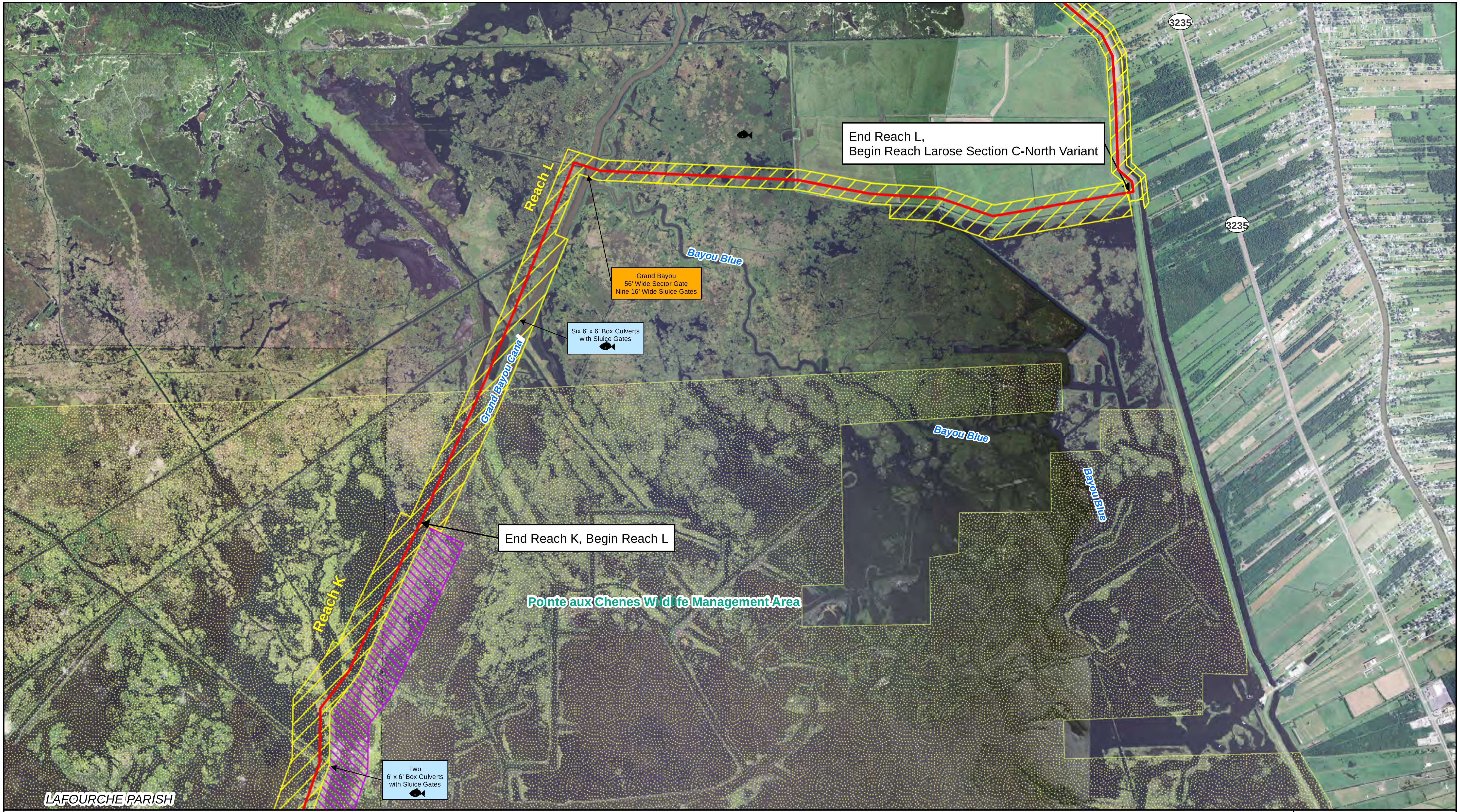


N

0 1,200 2,400
Feet

GEC
Gulf Engineers & Consultants

Figure: 10 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

- ☒ PumpStations
- 🟥 Centerline
- ▨ Right of Way
- ░ NWR or WMA
- ▨ Mitigation Area
- ░ Borrow Pits
- 1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

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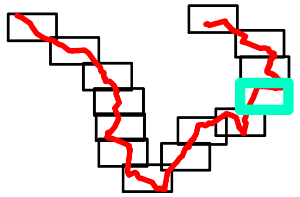
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

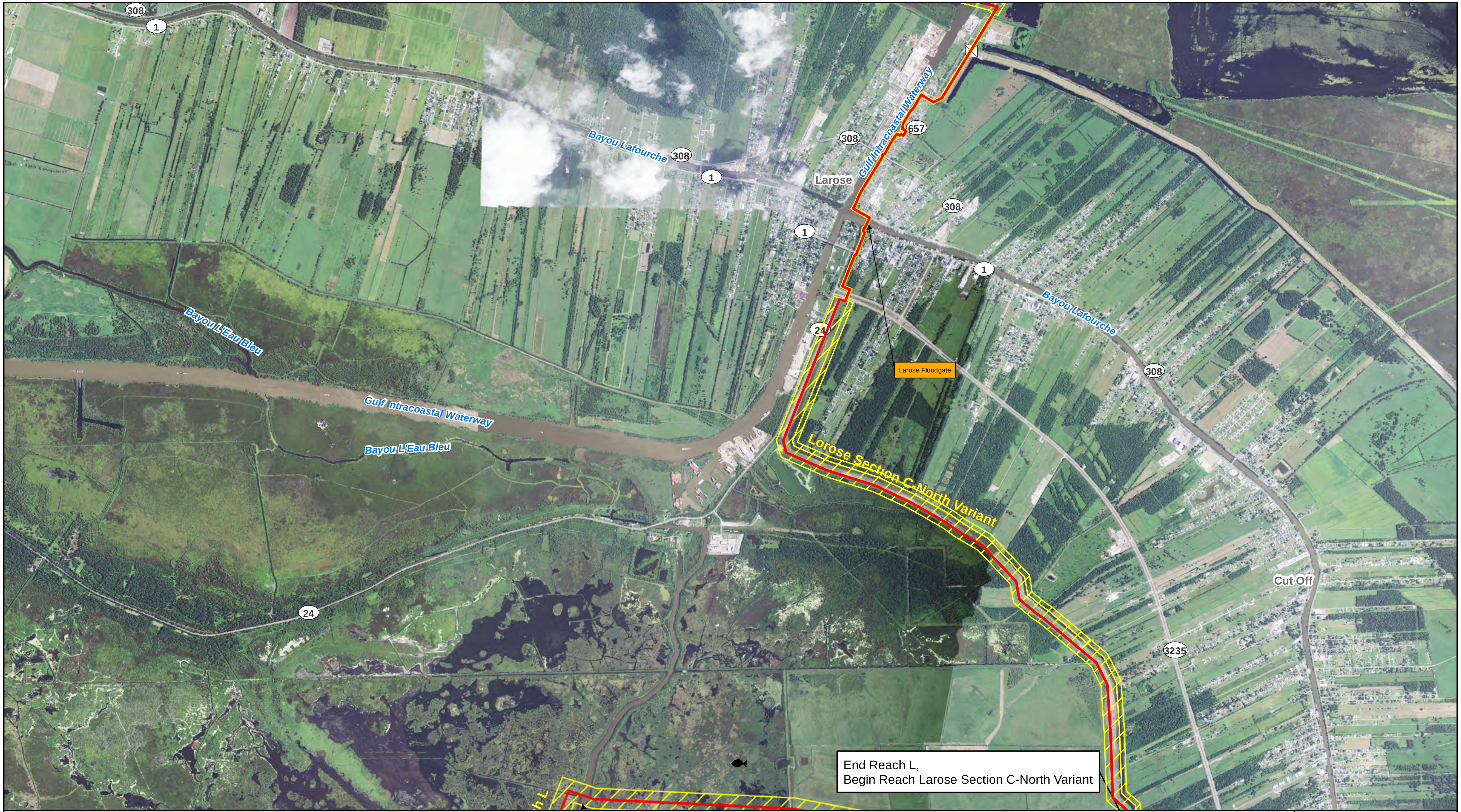


N

0 1,200 2,400
Feet

Gulf Engineers & Consultants

Figure: 11 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



Legend

☒ PumpStations

Centerline

▨ Right of Way

NWR or WMA

▨ Mitigation Area

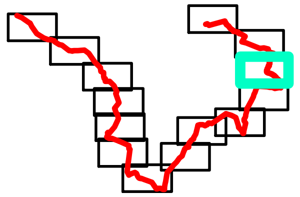
Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

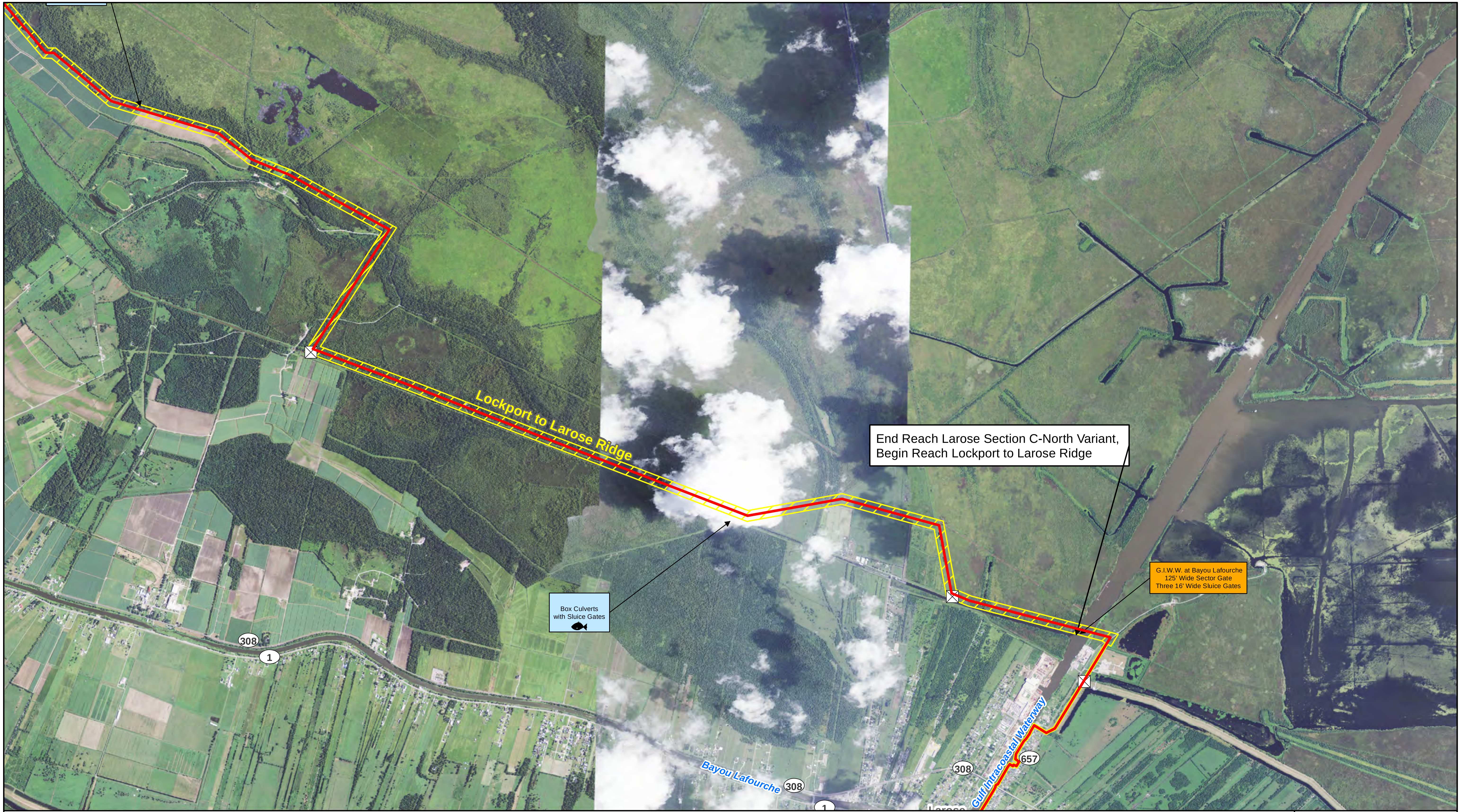


N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 12 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



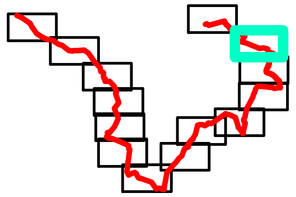
Legend

- ☒ PumpStations
- 🟥 Centerline
- ▨ Right of Way
- ░ NWR or WMA
- ▨ Mitigation Area
- ░ Borrow Pits
- 1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

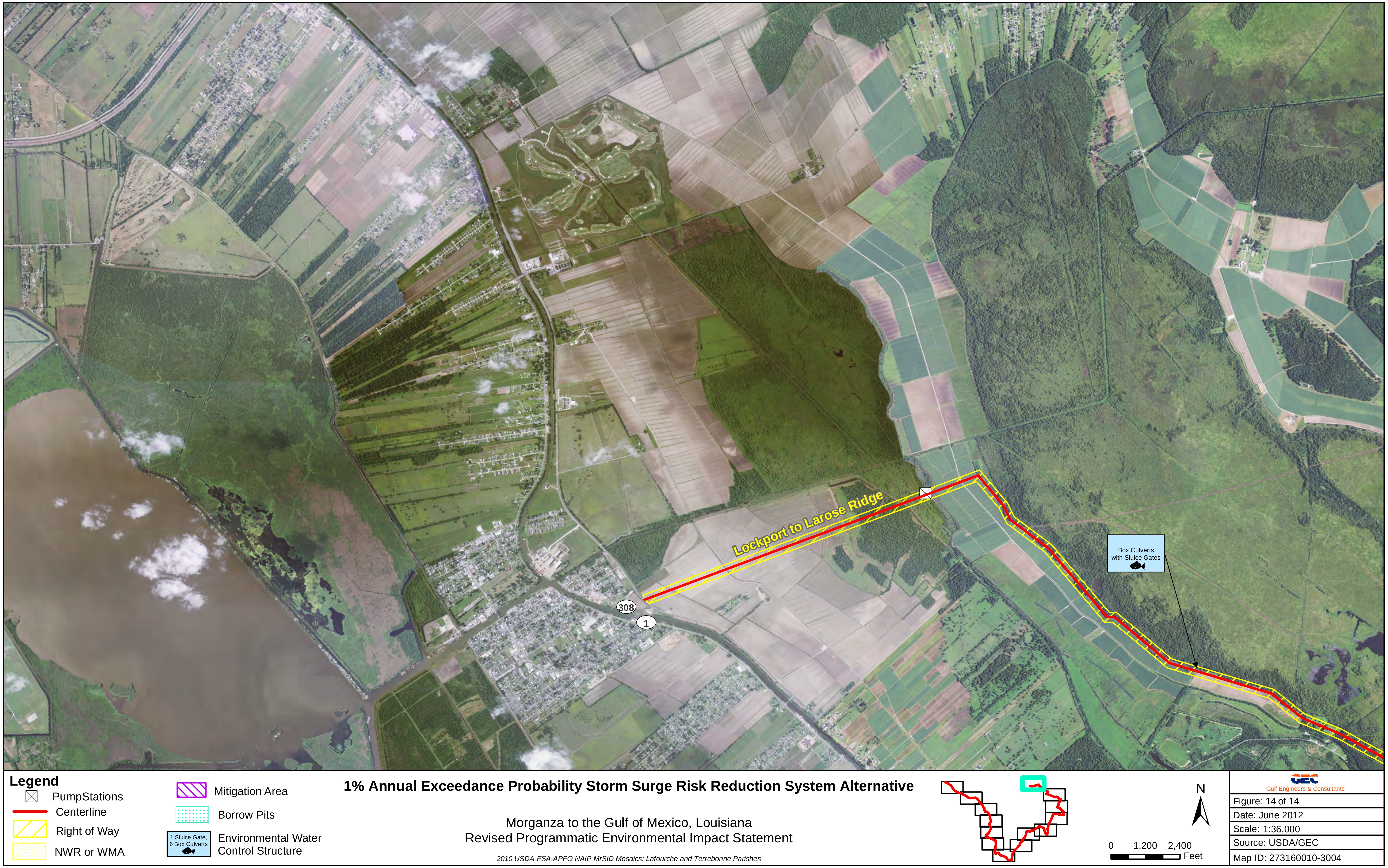
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



GEC
Gulf Engineers & Consultants

Figure: 13 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004



1% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

Figure: 14 of 14
Date: June 2012
Scale: 1:36,000
Source: USDA/GEC
Map ID: 273160010-3004

Bayou Black Canal
56' Wide Sector Gate

Six
6'x6' Box Culverts
with Sluice Gates

Six
6'x6' Box Culverts
with Sluice Gates

Six
6'x6' Box Culverts
with Sluice Gates

Elliot Jones Canal
20' Wide Stop Log Gate

Shell Canal West
30' Wide Stop Log Gate

Shell Canal East
56' Wide Sector Gate

Legend

☒ PumpStations

━ Centerline

▨ Right of Way

░ NWR or WMA

▨ Mitigation Area

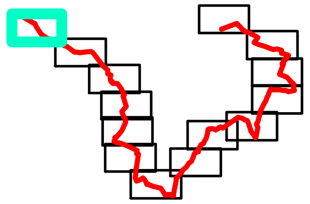
░ Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

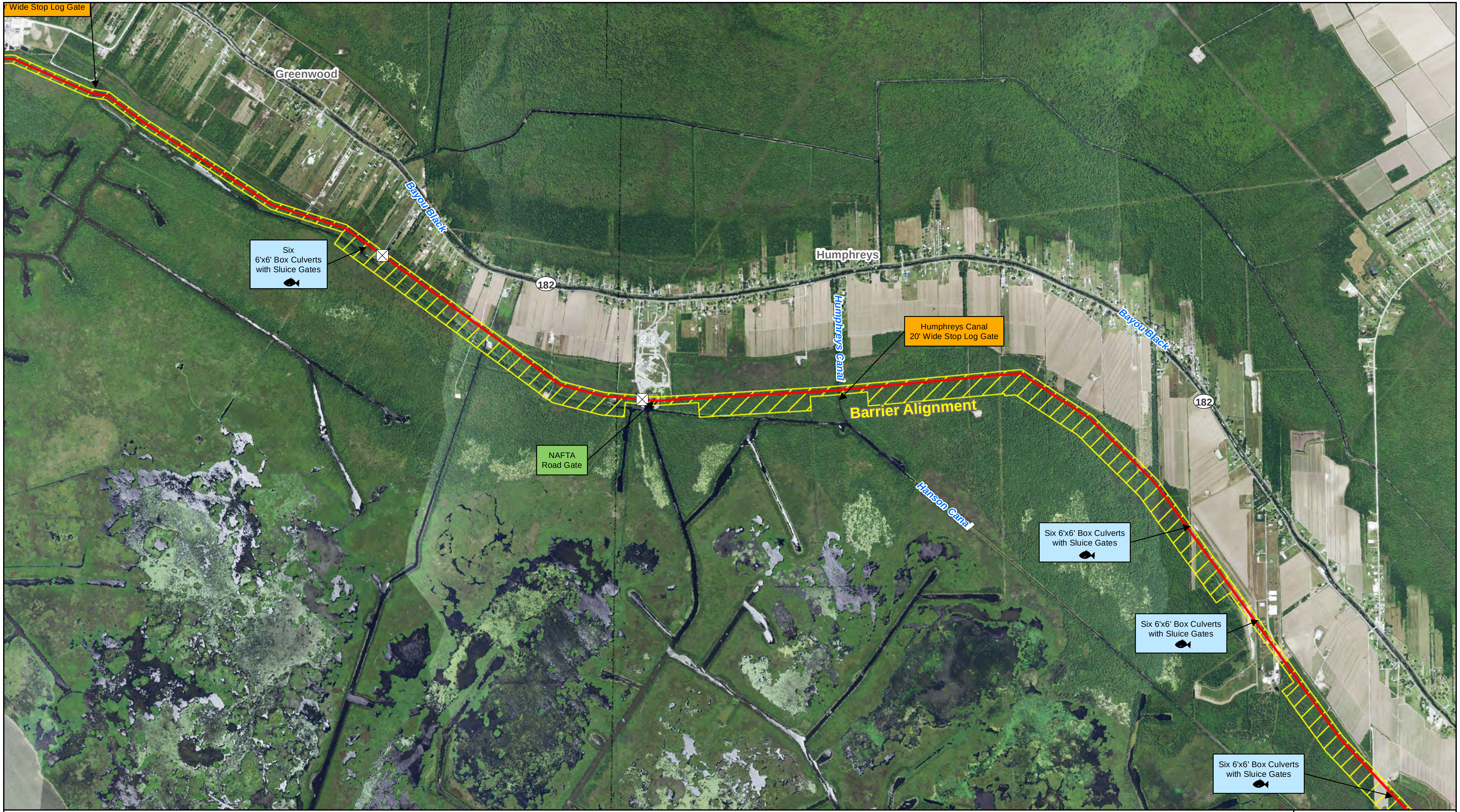


N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 01 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



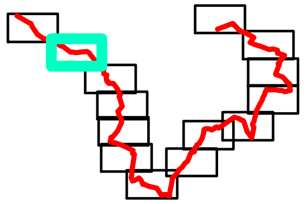
Legend

☒	PumpStations
🟥	Centerline
▨	Right of Way
▨	NWR or WMA
▨	Mitigation Area
▨	Borrow Pits
1 Sluice Gate, 6 Box Culverts	Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 02 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004

Legend

☒ PumpStations

Centerline

▨ Right of Way

NWR or WMA

▨ Mitigation Area

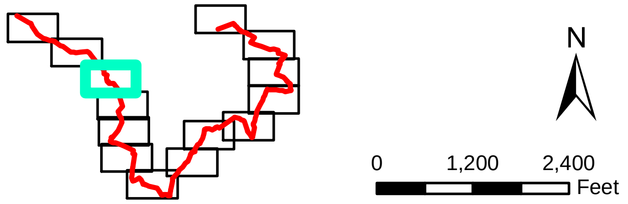
Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

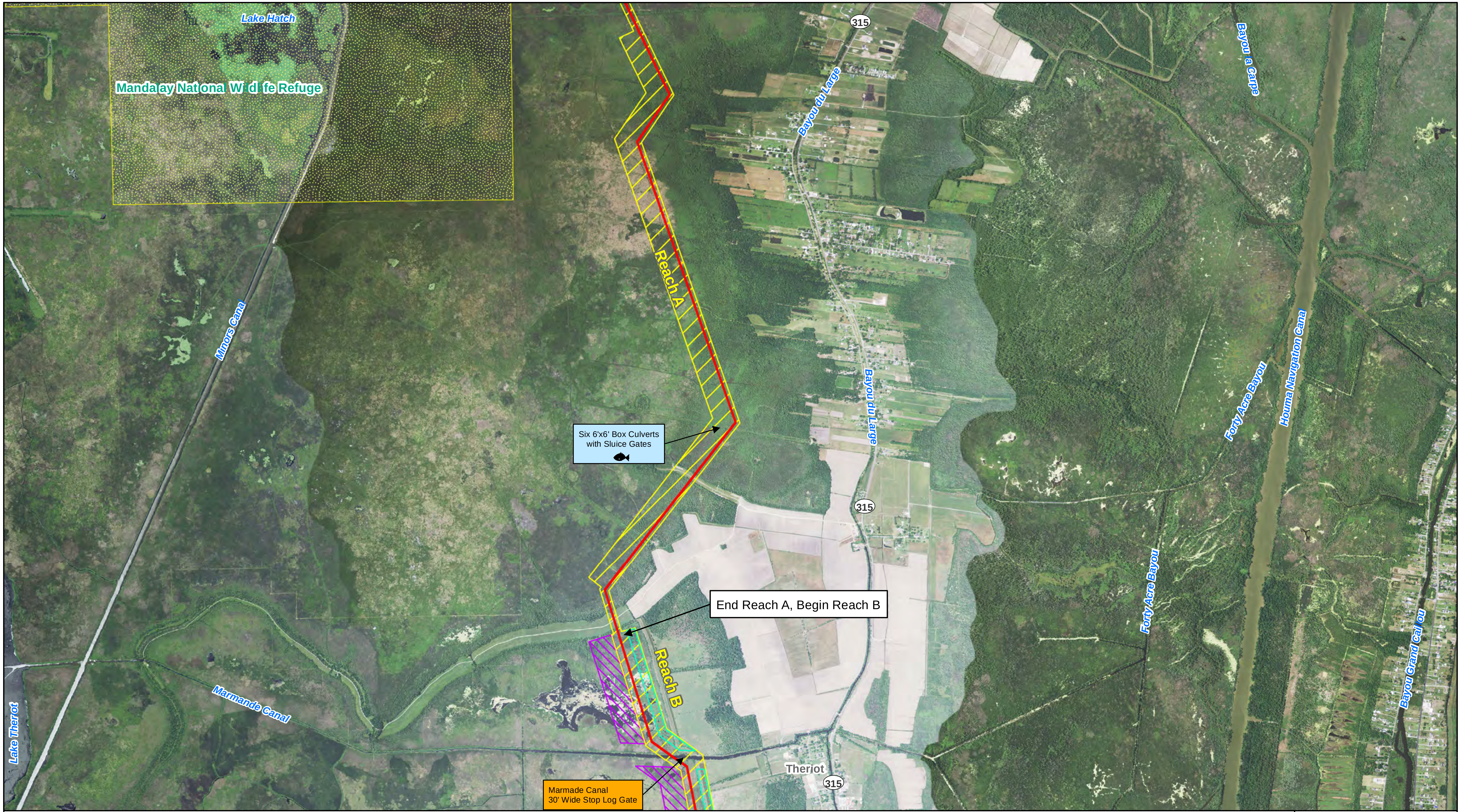
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



GEC
Gulf Engineers & Consultants

Figure: 03 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



Legend

- ☒ PumpStations
- Centerline
- ▨ Right of Way
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3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
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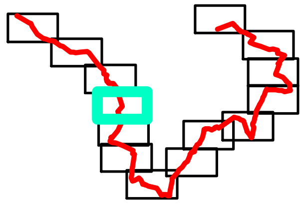
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes

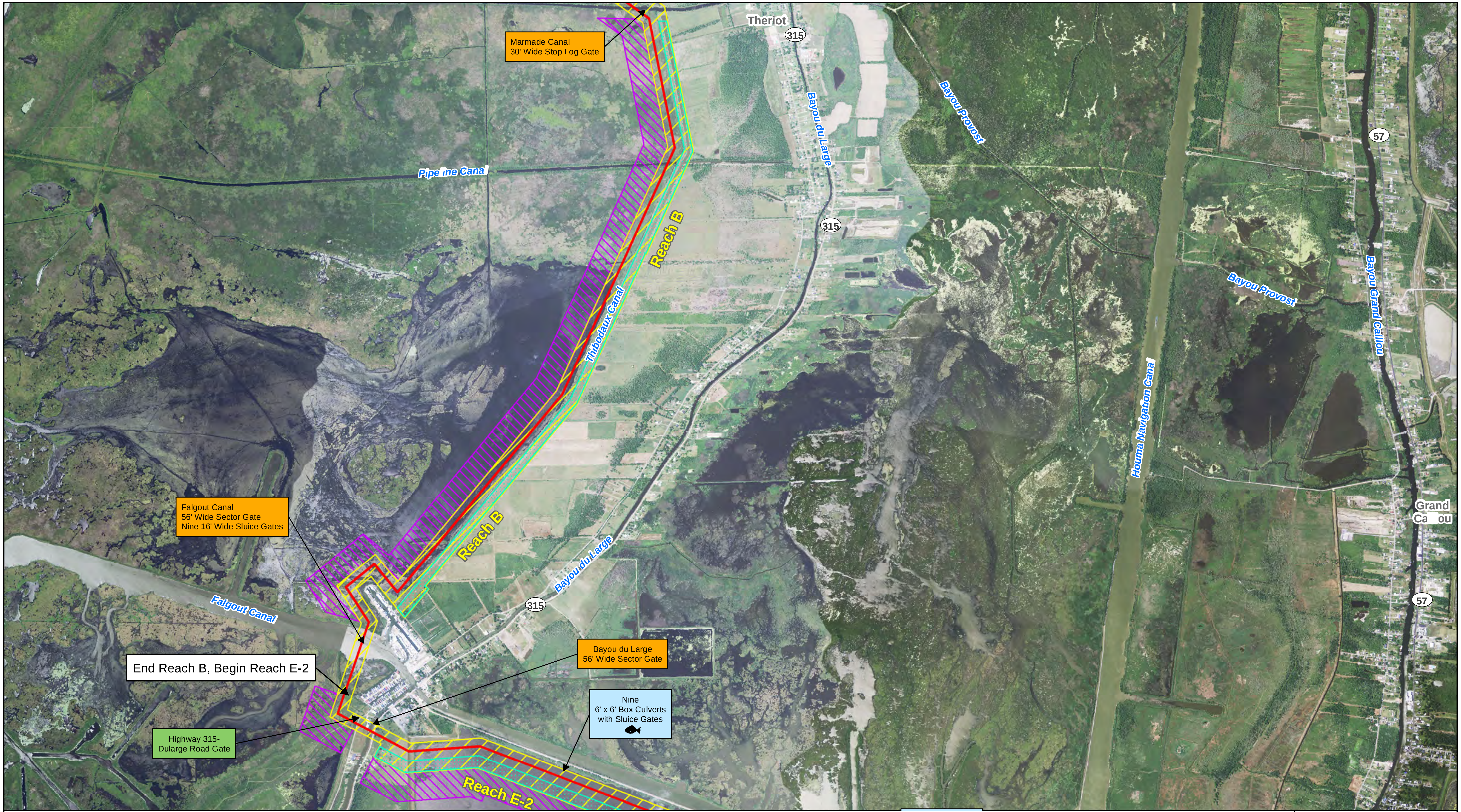


N

0 1,200 2,400 Feet

GEC
Gulf Engineers & Consultants

Figure: 04 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



Marmade Canal
30' Wide Stop Log Gate

Falgout Canal
56' Wide Sector Gate
Nine 16' Wide Sluice Gates

End Reach B, Begin Reach E-2

Bayou du Large
56' Wide Sector Gate

Nine
6' x 6' Box Culverts
with Sluice Gates

Highway 315-
Dularge Road Gate

Legend

- ☒ PumpStations
- Centerline
- ▨ Right of Way
- NWR or WMA
- ▨ Mitigation Area
- Borrow Pits
- 1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

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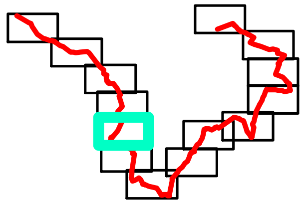
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



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Gulf Engineers & Consultants

Figure: 05 of 12
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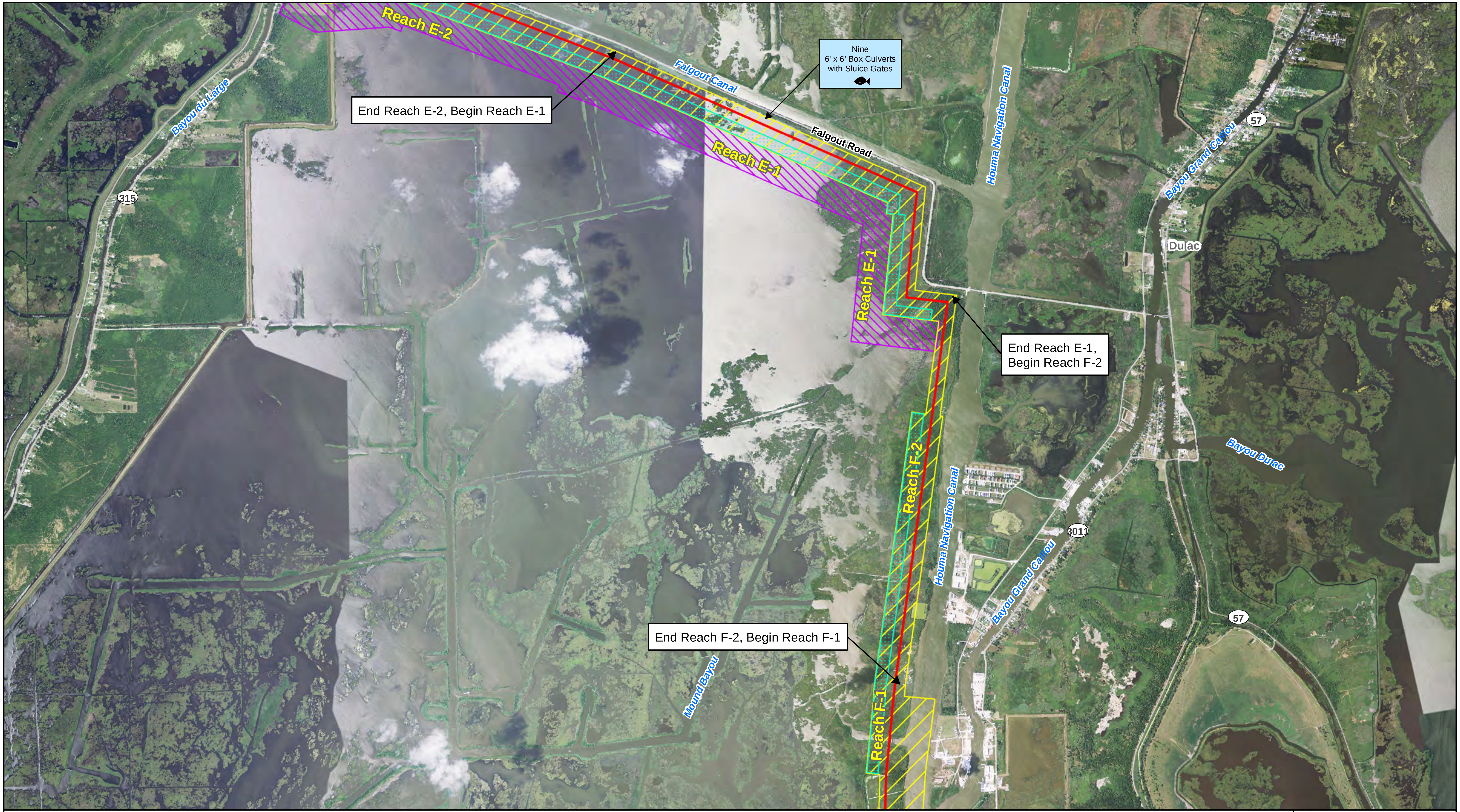
Map ID: 273160010-3004



Legend

☒	PumpStations
🟥	Centerline
▨	Right of Way
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▨	Mitigation Area
▨	Borrow Pits
1 Sluice Gate, 6 Box Culverts	Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
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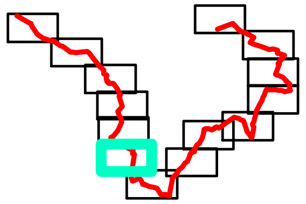
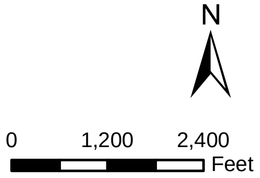
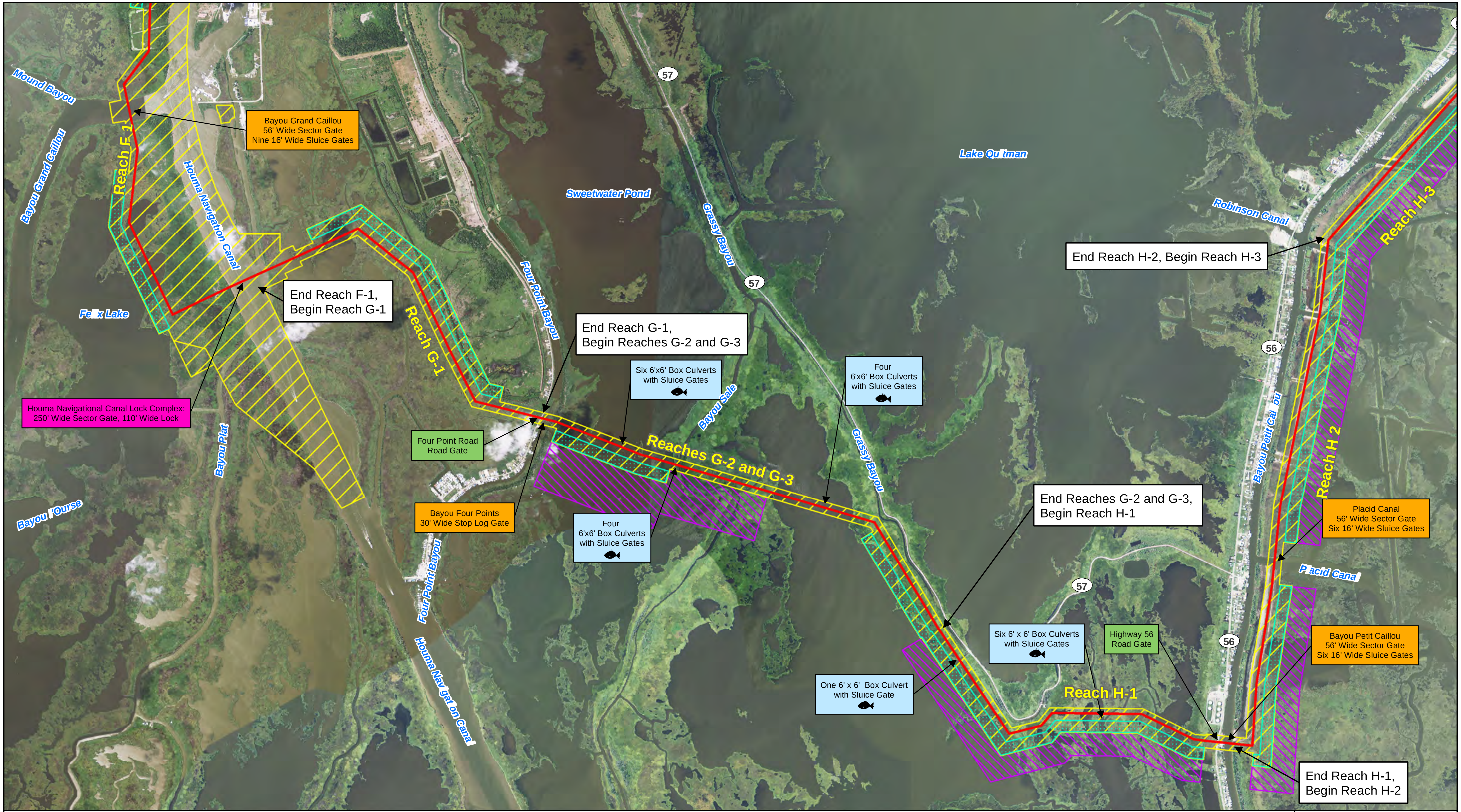
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes





GEC
Gulf Engineers & Consultants

Figure: 06 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



Legend

☒	PumpStations
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░	NWR or WMA
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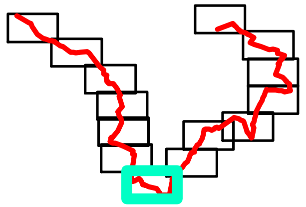

N

0 1,200 2,400 Feet

Gulf Engineers & Consultants

Figure: 07 of 12
Date: June 2012
Scale: 1:28,800
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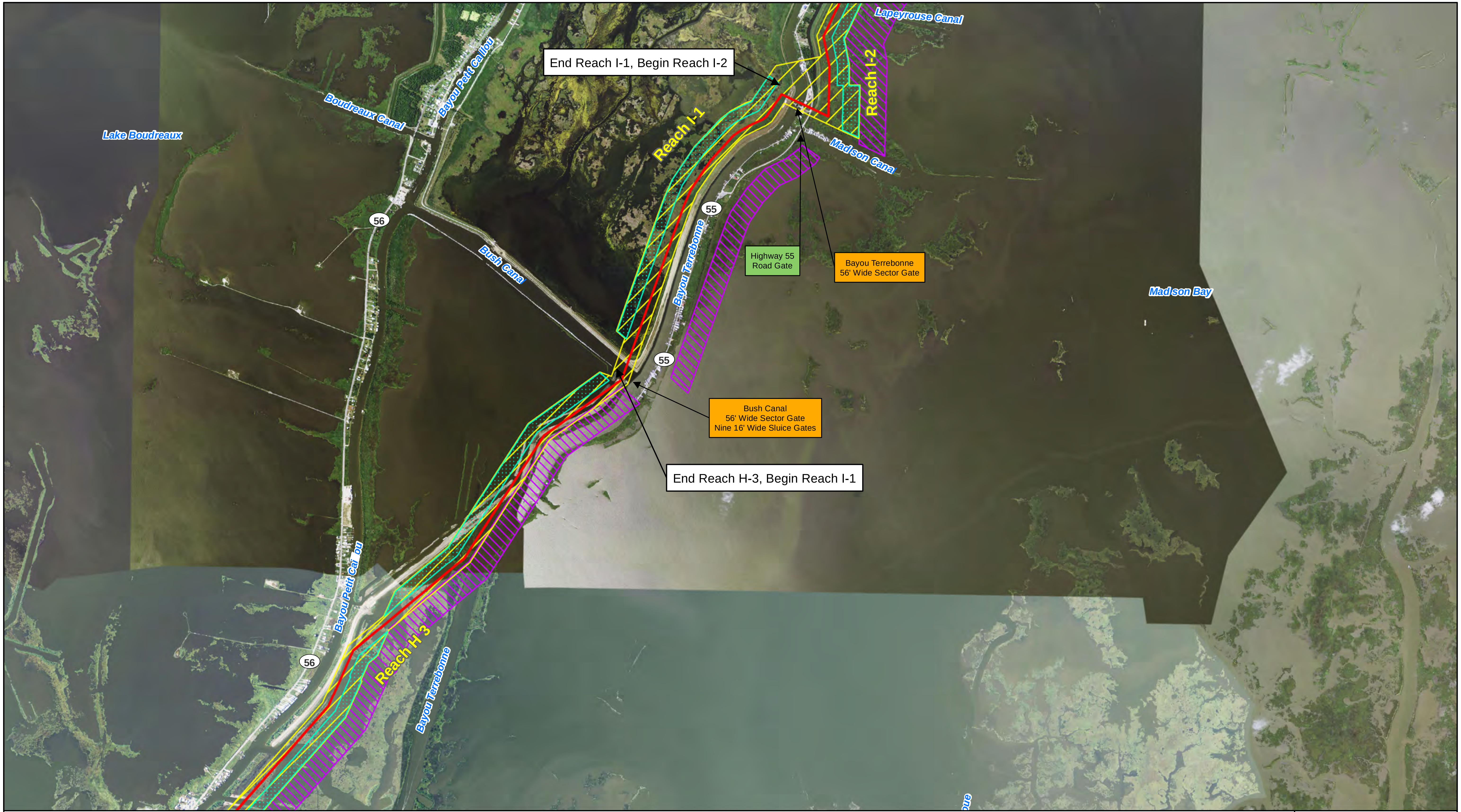
Map ID: 273160010-3004



Legend

☒ PumpStations

━ Centerline

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3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

Morganza to the Gulf of Mexico, Louisiana
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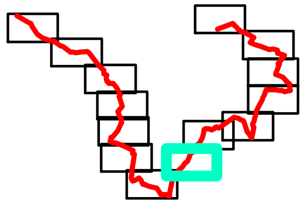
2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



N

0 1,200 2,400 Feet

Gulf Engineers & Consultants

Figure: 08 of 12
Date: June 2012
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Source: USDA/GEC
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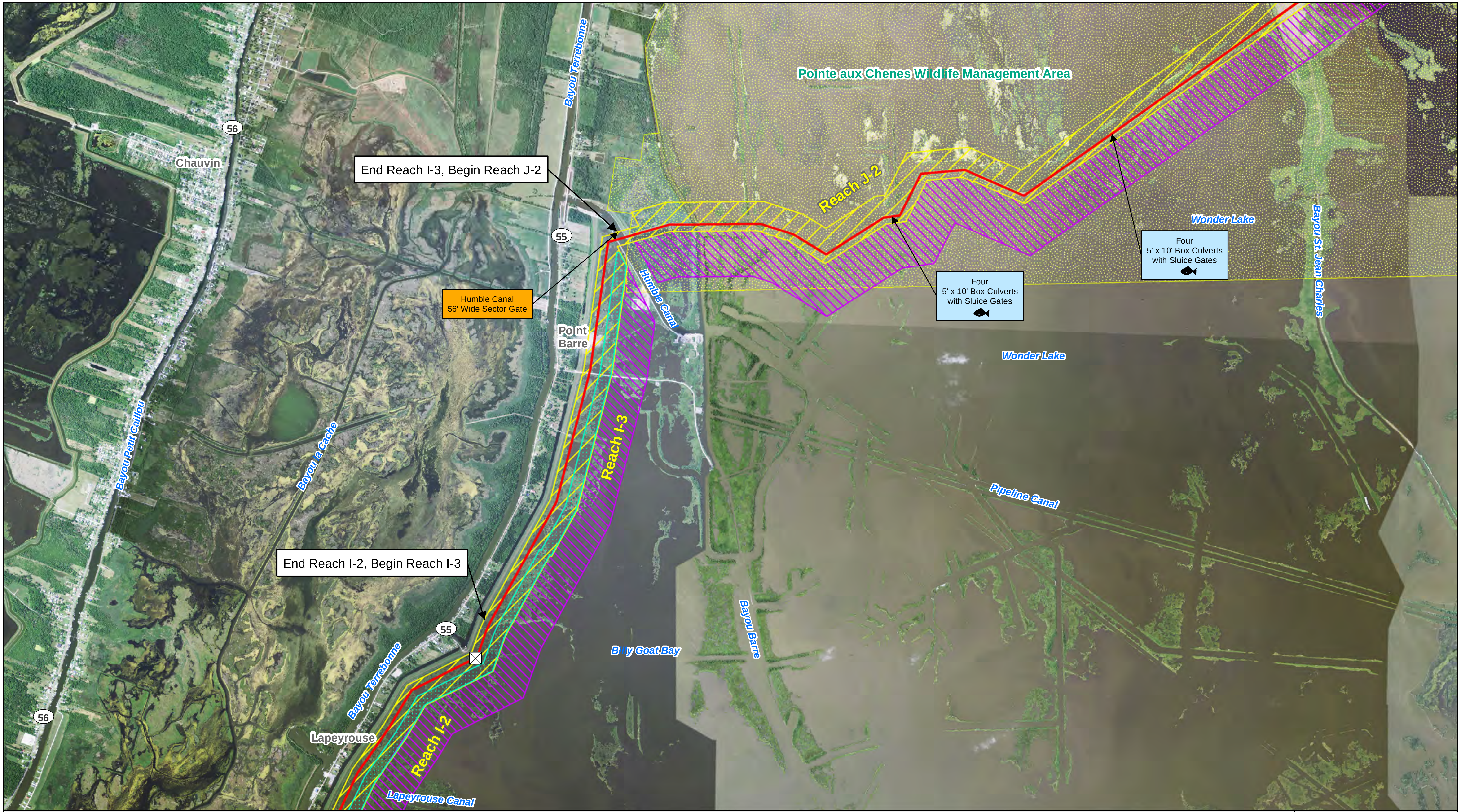

Legend

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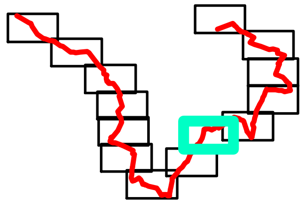
Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

2010 USDA-FSA-APFO NAIP MrSID Mosaics: Lafourche and Terrebonne Parishes



N

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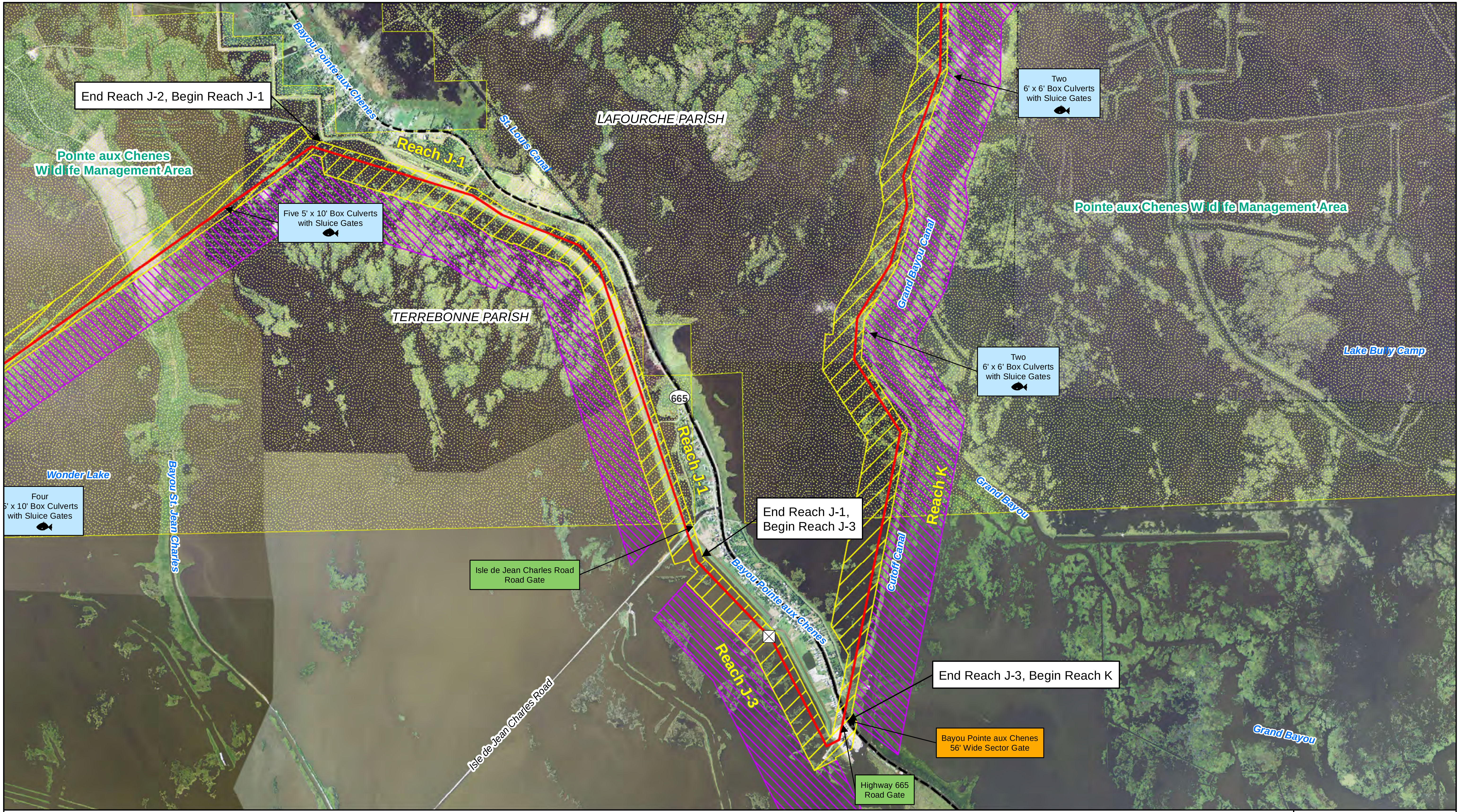
GEC
Gulf Engineers & Consultants

Figure: 09 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



Legend

☒ PumpStations

━ Centerline

▨ Right of Way

░ NWR or WMA

▨ Mitigation Area

░ Borrow Pits

1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

3% Annual Exceedance Probability Storm Surge Risk Reduction System Alternative

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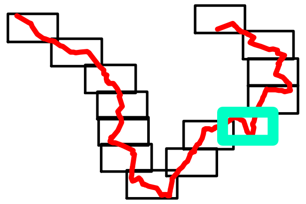

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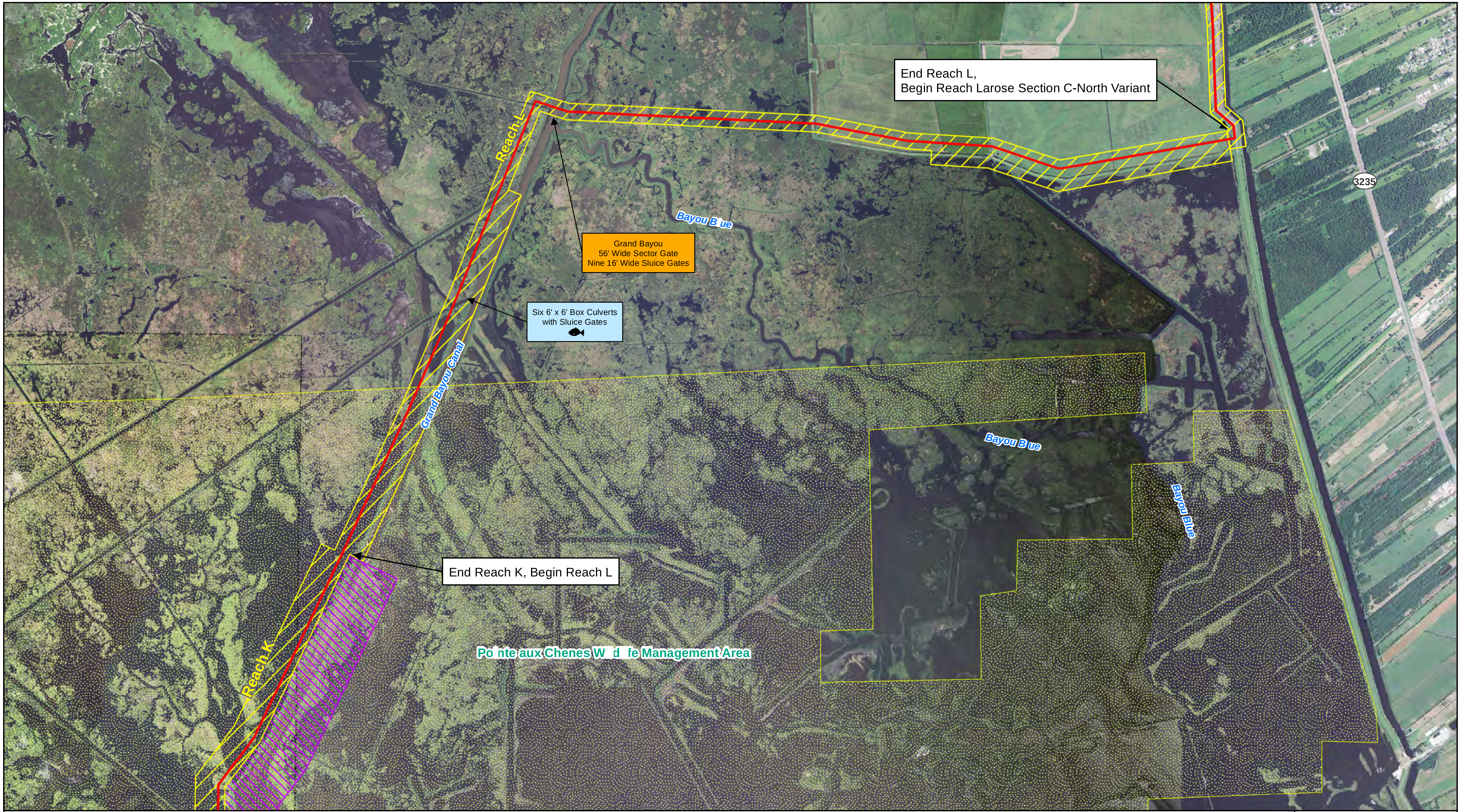
Gulf Engineers & Consultants

Figure: 10 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004



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NWR or WMA

▨ Mitigation Area

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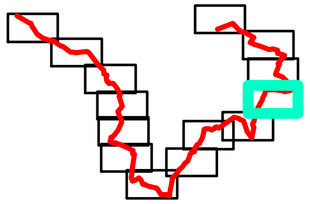

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Gulf Engineers & Consultants

Figure: 11 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004

Legend

☒ PumpStations
Centerline
Right of Way
NWR or WMA
Mitigation Area
Borrow Pits
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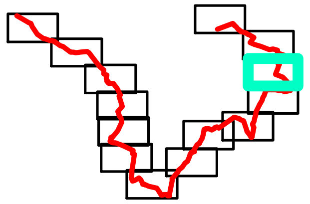

GEC
Gulf Engineers & Consultants

Figure: 12 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004

End Reach Larose Section C-North Variant, Begin Reach Lockport to Larose Ridge

Box Culverts with Sluice Gates

G.I.W.W. at Bayou Lafourche
125' Wide Sector Gate
Three 16' Wide Sluice Gates

Legend

- ☒ PumpStations
- ━ Centerline
- ▨ Right of Way
- ░ NWR or WMA
- ▨ Mitigation Area
- ░ Borrow Pits
- 1 Sluice Gate, 6 Box Culverts — Environmental Water Control Structure

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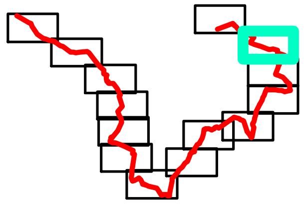

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Gulf Engineers & Consultants

Figure: 13 of 12	
Date: June 2012	
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Map ID: 273160010-3004	

Legend

☒ PumpStations

▬ Centerline

▨ Right of Way

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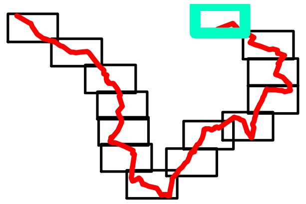

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Gulf Engineers & Consultants

Figure: 14 of 12
Date: June 2012
Scale: 1:28,800
Source: USDA/GEC
Map ID: 273160010-3004

Appendix H

AGENCY COORDINATION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

February 19, 2013

U.S. Army USACE of Engineers
New Orleans District
Attention: Nathan Dayan
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Dayan,

In accordance with our responsibilities under Section 309 of the Clean Air Act (CAA), the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) regulations for implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the Draft Revised Programmatic Environmental Impact Statement (DRPEIS) prepared by the U.S. Army USACE of Engineers (USACE). The USACE proposes to make changes and improvements in the planning, design, construction, operation, and maintenance of the Morganza to the Gulf hurricane and storm damage risk reduction system project to prevent future disasters to the greatest extent possible.

EPA rates the DRPEIS as "**EO-2**" i.e., EPA has "identified significant environmental impacts and we request additional information in the Final RPEIS (FRPEIS)". The EPA's Rating System Criteria can be found here: http://www.epa.gov/oecaerth/nepa/comments/ratings.html. The "EO" rating is based on the potential for significant adverse impacts to environmental justice communities, tribal communities, and coastal wetlands. These significant adverse impacts include the direct, indirect, and cumulative effects of the proposed project. The "2" indicates the DRPEIS does not contain sufficient information to fully assess direct, indirect, and cumulative impacts to environmental justice communities, identified Tribes, and coastal wetlands. Detailed comments are enclosed with this letter which identifies our concerns and informational needs requested for incorporation into the FRPEIS.

EPA appreciates the opportunity to review the DRPEIS. Please send our office one copy of the FRPEIS and an internet link or CD when it is sent to the Office of Federal Activities, EPA (Mail Code 2252A), Ariel Rios Federal Building, 1200 Pennsylvania Ave, N.W., Washington, D.C. 20004. Our classification will be published on the EPA website, http://www.epa.gov/compliance/nepa/comments/ratings.html, according to our responsibility under Section 309 of the CAA to inform the public of our views on the proposed Federal action.

If you have any questions or concerns, please contact me at 214-665-8126 or John MacFarlane of my staff at macfarlane.john@epa.gov or 214-665-7491 for assistance.

Sincerely,

Debra A. Griffin

Debra A. Griffin
Associate Director
Compliance Assurance and
Enforcement Division

Enclosure

DETAILED COMMENTS ON THE
U.S. ARMY USACE OF ENGINEERS'
DRAFT REVISED PROGRAMMATIC
ENVIRONMENTAL IMPACT STATEMENT
FOR THE
MORGANZA TO THE GULF OF MEXICO PROJECT
TERREBONNE AND LAFOURCHE PARISH, LOUISIANA

BACKGROUND: The U.S. Army Corps of Engineers (USACE) proposes to make changes and improvements in the planning, design, construction, operation, and maintenance of the Morganza to the Gulf hurricane and storm damage risk reduction system project to prevent future disasters to the greatest extent possible. The purpose of this project is to reduce the risk of damage caused by hurricane storm surges.

GENERAL COMMENTS:

The Environmental Protection Agency (EPA) has identified known environmental justice (EJ) communities and areas within the study area. The communities of Isle de Jean Charles and Point au Chien are associated with state-recognized tribes, where a large percentage of the population is minority and financially disadvantaged. Additionally, there are several communities of special concern outside of the proposed levee system. These communities include, but may not be limited to, Gibson, Bayou Dularge, Dulac, and Cocodrie.

The Isle de Jean Charles community has been previously identified as an EJ community with significant EJ concerns. Because of their special vulnerability, the proposed action, directly or indirectly, is likely to have disproportionate impacts on the Isle de Jean Charles community. Additional tribal communities could be similarly impacted due to effects on subsistence activities or cultural integrity, but are not mentioned in the Draft Revised Programmatic Environmental Impact Statement (DRPEIS), such as the Point au Chien Indian Tribe and United Houma Nation. The residents of these communities, and possibly other communities, are likely dependent, directly or indirectly, through their family or income sources, upon harvests of aquatic life for subsistence and livelihood.

In view of these special circumstances, EPA recommends that the USACE perform an appropriately detailed EJ analysis, immediately begin additional outreach and public involvement, consider alternatives to a buyout, and provide a detailed analysis of how buyout alternatives would avoid additional or cumulative, disproportionate impacts on EJ areas and communities.

In accordance with Executive Order (E.O.) 13175 and applicable federal laws and policies, all federally recognized tribes that may be affected by the proposed project through potential impacts upon their citizens, resources, lands, culture, or traditional lifeways, should be identified and offered formal government to government consultation. Compliance with E.O. 13175 was not documented in the DRPEIS. If this consultation has not been done, the USACE should immediately contact the Chitimacha Tribe of Louisiana and other federally recognized tribes for both government-to-government (E.O. 13175) and National Historic Preservation Act (NHPA) consultation. Although the USACE is not required to contact state-recognized tribes for consultation under E.O. 13175, the EPA encourages the USACE to engage these and other stakeholders, especially since these communicates are already overburdened and may have additional cultural sites of interest.

Utilizing information obtained through coordination with residents, stakeholders, and consultation with federally recognized tribes, the USACE should develop and refine its preliminary buyout plan. Buyout options should include relocation of intact communities where the potential for irreparable harm exists for unique cultures, languages, and traditions that may be lost if the community is broken up, such as in the case of the Isle de Jean Charles. The USACE should provide a schedule and detailed information for the proposed sequence of construction and buyout alternatives.

Approximately 85 miles of this proposed 98-mile levee system would be built on or adjacent to existing hydrologic barriers, including natural ridges, roads, and existing levees. This helps minimize the potential for indirect adverse impacts to wetlands and other aquatic resources. Nevertheless, tens of thousands of acres of wetlands and open waters would be enclosed within the levee system, and thus could be indirectly affected. In addition to avoiding and minimizing direct wetland impacts, the design and implementation of this levee system must focus on the larger and more complex challenge of minimizing indirect impacts to these valuable aquatic resources.

The USACE is planning to minimize adverse indirect impacts from this project by designing gates and water control structures to allow sufficient ingress and egress of aquatic organisms and to reduce wetland degradation due to prolonged impoundment and/or other hydrologic changes. To that end, the gates and water control structures in the levee system are intended to remain open except when the project area is threatened by a storm surge. In the long term, however, subsidence combined with sea level rise will likely lead to a significant increase in the frequency of closure of these gates and water control structures. For example, the Draft Post Authorization Change (PAC) Report and DRPEIS state that by the year 2085, the Houma Navigation Canal floodgate could be closed between 168 and 365 days per year, depending on the assumed rate of relative sea level rise. Such increased closure could significantly impact wetlands, water quality, fisheries, and navigation – and would in effect be a profound deviation from the design intent of this levee system. What is proposed as an open levee system would increasingly become a closed one, with potentially significant socioeconomic and environmental consequences.

The potential for increased frequency of gate and water control structure closure appears to be a major long-term environmental and socioeconomic risk of this proposed levee system. The Final Revised PEIS (FRPEIS) should ensure that the public and decision-makers are adequately apprised of this risk. The potential adverse environmental and socioeconomic impacts of increased structure closure should be assessed in the section on environmental consequences. Given the long-term and potentially significant ramifications of this issue, we would also recommend that it be highlighted in the summary sections of both documents. The FRPEIS should also provide more detail on ways this challenge might be addressed in the future.

For example, the Draft PAC Report discusses the possibility of converting the proposed gates to locks and installing “additional pumps behind the levee system”. Does this suggest that portions of the proposed project could be converted to forced drainage? Finally, the USACE should consider discussing this issue in the FRPEIS section regarding “unresolved issues”, as there does not appear to be a clear path forward identified for addressing this concern and ensuring adequate hydrology and navigation in the long term.

Reducing flood risk in the study area is certainly in the public interest. For such benefits to be realized, the public must fully understand the level of risk reduction afforded by the proposed project. It would be counterproductive if construction of the proposed project were to provide residents of the area with a false sense of security, thereby possibly affecting evacuation rates and/or decisions regarding how and where to build homes and businesses. As part of its ongoing work on this project, the USACE should endeavor to ensure that residents in the area understand the residual flood risk that would remain while the project is being constructed and when it is complete, and work to ensure that flood risk in the area does not increase as a result of further development in high risk areas.

Following are detailed comments and recommendations pertaining to specific portions of the DRPEIS and Draft PAC Report. We thank the USACE for its ongoing coordination with EPA on this important matter and for its consideration of these recommendations. We remain committed to working with the USACE and other stakeholders to address these matters as expeditiously as possible.

DETAILED COMMENTS:

3.7.2 Wetland Loss, page 3-12

This section states “Principal impacts to the marshes in the study area are due to storm surge and associated erosion and saltwater intrusion.” No mention is made to the many miles of oil and gas canals and navigation channels which allow for increased saltwater intrusion, while also disrupting natural surface hydrology throughout the study area. As currently worded, this section could suggest to the reader that the severe wetland loss in the study area is solely a natural phenomenon.

Recommendation:

This section should be revised to include all actions, past and present, that have led to coastal wetland loss. These actions include oil and gas extraction, pipeline canals, navigational projects, commercial and residential development, and global sea level rise.

3.8.2 Coastal Restoration Opportunities, page 3-13

The Draft PAC Report and DRPEIS state that the proposed levee system “would complement state and Federal coastal restoration projects” by providing protection against coastal erosion and the adverse effects of storm surge (Draft PAC Report, pages ix and 60; DRPEIS, Abstract-i). We recognize that aspects of this system may have the potential to provide environmental benefits, particularly the proposed lock on the Houma Navigation Canal. As discussed above, however, the proposed levee system could also result in long-term negative environmental effects which could be counter to coastal restoration goals. In particular, relative sea level rise would likely result in an increase in the frequency of closure of the system's floodgates and water control structures, potentially reducing ingress and egress of aquatic organisms, increasing impoundment of enclosed wetlands, harming water quality, and interfering with navigation and commerce.

Recommendation:

Although the full extent of such negative impacts has not been adequately assessed, statements regarding the net indirect environmental effects of this levee system should at a minimum indicate that there is the potential for negative effects in the future – effects which might outweigh any potential near-term environmental benefits.

4. ALTERNATIVES

4.3.7 Induced Flooding Impacts, page 4-20 and 6.14.1 Population and Housing, page 6-33

Section 4.3.7 discusses "constructible features" and "programmatic project features" of the overall levee system. The document is intended to provide sufficient detail such that no further NEPA documentation is needed for the constructible features, whereas the programmatic project features would require further NEPA analysis at some later date. Hydrologic modeling indicates that the proposed levee system could potentially increase storm surge flooding in areas outside of the levee. For this reason, the DRPEIS, Draft PAC Report, and the Real Estate Plan discuss a preliminary nonstructural buyout plan for approximately 1,000 structures and 2,500 people potentially affected by induced surge.

This preliminary buyout plan does not appear to be a constructible feature – meaning that further analysis would be needed before it could be implemented. In addition, the Real Estate Plan states on page 20 "Relocations will be accomplished in phases along with project construction…" and calculates 15 year time frame for property acquisition. This raises the question as to whether implementation of the constructible levee features could increase flood risks outside the levee system prior to implementation of a buyout program or some other non-structural response. If portions of the levee are built prior to addressing the risks associated with induced surge, then people and properties, including EJ communities, outside of the levee system are potentially exposed to increased flood risk, with no certainty as to whether or when a non-structural risk reduction program would actually be implemented. This has the potential to create a direct disproportionate impact on EJ communities.

Recommendation:

EPA recommends the USACE assess whether implementation of the constructible features would result in increased surge risk to properties and people outside the proposed levee system. If so, we recommend that the FRPEIS include as constructible features those nonstructural measures needed to address such increased risk and assess this disproportionate impact in the EJ analysis.

5. AFFECTED ENVIROMENT

5.2.9 Air Quality, page 5-38

This section discusses the nonattainment/maintenance history of Lafourche Parish for both the 1-hour ozone and 8-hour ozone National Ambient Air Quality Standards (NAAQS). It is correctly noted that Lafourche Parish has an EPA-approved 110(a)(1) maintenance plan for ozone.

Recommendation:

Please include a discussion to clarify that 110(a)(1) maintenance areas are not subject to the air quality conformity requirements of Clean Air Act Section 176(c). Also include the distinction that EPA's March 24, 2008 approval of the Lafourche Parish 110(a)(1) maintenance plan pertains to the 1997 8-hour ozone NAAQS. EPA completed the designations process under the 2008 8-hour ozone NAAQS on April 30, 2012 (77 FR 30088), and Lafourche Parish was designated as unclassifiable/attainment for this standard.

5.2.13 Socioeconomics

The location of the proposed project occurs in EPA-identified EJ areas, including Isle de Jean Charles. The EJ assessment for the DRPEIS is inadequate, provides little detail, and has no in-depth analysis. The DRPEIS fails to identify with any specificity, the communities that are likely to be impacted or their characteristics, and it fails to identify particular minorities or ethnic groups impacted.

Recommendation:

The FRPEIS should include a detailed socioeconomic analysis for potential EJ impacts comparing the demographics and potential environmental impact of those inside the levees with those who are outside the system. In addition, the USACE should consider the potential impacts of increased storm surge and flooding due to the timing of levee construction in the EJ analysis.

Community Cohesion, page 5-47

The discussion of "community cohesion" is inadequate in that it fails to identify, discuss, or address unique community attributes associated with tribes, such as language, culture, religion, tradition, governance, and other necessary attributes for continuing survival of a tribe or band of Indians, some of which are known to reside in this area (for example the Isle de Jean Charles band of Biloxi-Chitimacha, Point au Chien Indian Tribe, and United Houma Nation). If these attributes are not identified, then it is not possible to consider direct, indirect, or cumulative impacts of the alternatives on these communities. It is well known that intrusion by non-natives into traditional communities can lead to erosion of tradition and loss of language. If a traditional community is physically relocated, impacts will be even more severe. If a traditional community is split up, the culture, language, and traditions are most likely going to be irretrievably lost.

Recommendation:

The USACE should develop additional alternatives for residents that are outside the proposed levee system (e.g., Isle de Jean Charles). This should include the buyouts as stated in the DRPEIS, but should also include non buyout alternatives like ring levees, house elevation, etc. Alternatives should recognize and protect the uniqueness of the Isle de Jean Charles community and maximize community cohesion by developing alternatives that have a concerted effort to protect, buyout, or move Isle de Jean Charles residents as an intact community. USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts.

Environmental Justice, page 5-48

Page 5-48 states "For purposes of this analysis, all census tracts within the project footprint are defined as the EJ study area. Lafourche Parish and Terrebonne Parish are considered as reference communities of comparison." It is unclear why U.S. Census Bureau Census Tracts were used as base assessment units instead of smaller geographic units such as Census Block Groups. There are fourteen Census Tracts that were the basis of the EJ assessment. Of these fourteen, five were considered low income by the USACE, approximately 35.7% of the tracts. The USACE states that the tracts considered low income are not within the path of levee construction, are sparsely populated, or are similarly affected and therefore, there are no potential EJ impacts. EPA is concerned that the geographic unit selected for analysis does not accurately reflect the demographics of the area, and in particular the poverty level. There are 142 Block Groups within the two parishes identified for this project. Of those 142 Block Groups, 119 Block Groups, or 83.8%, meet the definition of low income/poverty as stated in the DRPEIS. Additionally, 39.4% of the Block Groups in the project area fall within the census definition of "extremely low income," that is, Block Groups that are greater than 40% low income.

Recommendation:

The USACE should use Census Block Groups or a geographic unit smaller than Tracts, to perform socioeconomic and EJ assessments in order to obtain a more accurate estimate of the demographics of the area and thus a more accurate depiction of the potential impacts of the proposed project. The USACE should discuss its rationale for the criteria used (e.g., 50% minority, etc.). A more in-depth analysis is needed in order to describe the minority make-up of the communities (e.g, Asian, Native American, etc.) and analyze the potential impacts of the proposed project that may affect each ethnic group differently.

Environmental Justice, page 5-48

Page 5-48 also states "All residents, irrespective of minority status or income level, are expected to be similarly impacted by construction activities." EPA strongly disagrees with this statement since the USACE did not compare residents inside the proposed levee system with residents outside the levee system and how they may be potentially impacted by the timing of construction and the lack of details concerning the buyout.

Recommendation:

The USACE should perform an EJ analysis characterizing and comparing these two populations. The DRPEIS should provide a similar level of detail on the buyout activities as it does for the engineering and economic aspects of levee construction.

Tribal Issues, page 5-49

It is stated on page 5-49 “Additionally, approximately 230 members of the state recognized Biloxi-Chitimacha tribe are located on Isle de Jean Charles, which is outside of the southern boundary of the project alignment in Terrebonne Parish. While this raises a potential EJ issue, with respect to alternative protection alignments, neither of the alternatives to the No Action Alternative authorized for study under the PAC represents a separate alignment that includes this community. Providing hurricane risk reduction for these residents has been determined in previous Corps of Engineers analyses to be cost prohibitive.” The DRPEIS does not reflect any attempt by the USACE to contact the Biloxi-Chitimacha tribe as an interested stakeholder. This Tribe has lived in this area for over 130 years and they have lost most of their land through a history of war, disease, displacement and poverty, erosion, and past governmental decisions. They are very much in danger of losing their “community cohesion,” including their language, culture, and traditions. EPA is concerned that this “potential EJ issue” has not been analyzed in detail as several of our comments suggest. In addition, it is unclear whether the USACE contacted the federally-recognized Chitimacha Tribe of Louisiana regarding cultural resources in southern Louisiana or whether the USACE contacted them under E.O. 13175 for government-to-government consultation.

The USACE does not describe when it determined that hurricane risk reduction for the residents of Isle de Jean Charles was cost prohibitive and whether options other than buyouts were developed or considered.

Recommendation:

The USACE should directly contact the Chief of the Isle de Jean Charles Band of the Biloxi-Chitimacha-Choctaw Indians, the Point au Chien Indian Tribe, and United Houma Nation, and appropriate residents of these communities, so they can have meaningful participation in the NEPA and buyout processes. Given the remote and rural nature of these locations, solely advertising a public meeting in the Houma newspaper is inadequate. A more concerted effort to contact individuals in these communities is necessary because people may not speak English, receive local newspapers, and/or may have a fear of governmental authorities.

6. ENVIRONMENTAL CONSEQUENCES

General Comments

EPA believes that a majority of the resources were not properly evaluated for their environmental consequences. In most cases, impacts are stated in generalities and only the magnitude (the amount of change) is specified. However, the extent (how vast is the change), direction (how dynamic is the change), duration (how lasting is the change), and speed (how rapid is the change) of the impact should be disclosed as well. Otherwise stated, the Environmental Consequences chapter should discuss and analyze how and why the proposed project affects the overall health of the resources within the study area.

Indirect Impacts

EPA believes that the indirect impacts analysis has not fully disclosed the entirety of indirect impacts. The following are examples of how the indirect impacts analysis should be strengthened.

The Draft PAC Report asserts that the proposed environmental control structures in the levee system “mitigate for indirect impacts of the levee system by matching and/or enhancing existing drainage patterns during non-storm conditions” (Draft PAC Report, page ii). This statement should be amended to account for the potential long-term indirect impacts associated with the projected increase in the closure frequency of the system’s gates and water control structures.

The Draft PAC Report states on page 83 that “The Habitat Evaluation Team determined that no indirect impacts to wetlands would result from the project.” A similar statement is made on page 6-62 of the DRPEIS. EPA takes issue with this assertion. While potential near-term hydrologic effects of the levee system could theoretically be negligible, the USACE’s own analysis regarding the frequency of gate and water control structure closure in the future strongly suggests that the project could result in significant long-term adverse impacts to wetlands, water quality, and fisheries (along with navigation).

The last sentence on page 19 of Appendix C states that “…the project would not induce significant changes on the hydrology of the estuary.” It is not clear how this could be consistent with the USACE’s projections regarding increased closure frequency of gates and water control structures in the long-term. While this section does discuss the possibility that the sponsor might wish to modify the closure criteria to address non-storm water stages, there is no discussion of the potentially significant changes in circulation that could occur with the increased closure frequency projected using the current closure criteria. As with other portions of the DRPEIS, EPA recommends the USACE describe the potential indirect impacts that could occur due to increased closure frequency of gates and water control structures due to relative sea level rise, with the focus in this section being on estuarine flow and current patterns.

The discussion of cumulative effects on the aquatic ecosystem on page 37 of Appendix C states that “No long-term, negative cumulative impacts are anticipated.” Here again, it is unclear how the projections regarding future frequency of gate and structure closure could support such a conclusion.

Recommendation:

The FRPEIS should include a comprehensive indirect impacts analysis and fully disclose all effects caused by the action that occur later in time or are farther removed in distance.

Cumulative Impacts

Due to the expansive nature of this project and the environmental sensitivity of the study area, EPA believes a more comprehensive and wide-ranging cumulative impacts analysis should be completed. The purpose of a cumulative impacts analysis is to ensure federal decisions consider the full range of consequences of actions. Without a thorough cumulative impacts analysis, the full range of environmental consequences is impossible to quantify. The study area is an ecologically sensitive area that is rapidly degrading. Past actions such as oil and gas extraction, including pipeline canals, navigational projects, federal and local levee construction, and industrial, commercial, and residential development, along with storm surge, have led to the degradation of coastal wetlands. These same actions would continue the alteration of the natural hydrology, leading to additional coastal wetland loss. Future projects, such as the Houma Navigation Canal project, Coastal Impact Assistance Program projects, Louisiana Coastal Area Plan projects, and Coastal Wetlands Planning, Protection, and Restoration Act projects, along with the actions listed above, should be analyzed for their potential impacts to coastal Louisiana. In addition, the global issue of sea level rise should be incorporated into this discussion.

Recommendation:

The FRPEIS should include a comprehensive cumulative impacts analysis by establishing spatial and temporal boundaries for significant resources and including a list and description of past, present, and reasonably foreseeable future projects. An attempt was made to establish boundaries and list projects; however, much more detail is required. The analysis should include the overall impacts to the environment that can be expected if the individual projects and their impacts, including the proposed project, are allowed to accumulate.

We refer you to the Council on Environmental Quality's "Considering Cumulative Effects Under the National Environmental Policy Act" and EPA's "Consideration Of Cumulative Impacts In EPA Review of NEPA Documents" for assistance with writing a more comprehensive cumulative impacts analysis.

6.2 Coastal Vegetation and Wetlands

Table 6-1 of the DRPEIS indicates that, assuming intermediate sea level rise, a total of 670 and 3,443 acres of wetlands would be directly impacted by the constructible and programmatic features, respectively. In the same table, there appears to be an error in the calculation of total wetland impacts, which is currently listed at 2,993 acres, again assuming intermediate sea level rise. These direct wetland impact numbers are inconsistent with those provided in Appendix C, which on pages 4 and 5 indicates that the constructible features would result in direct impacts to 721 acres of marsh. Page 35 of the same appendix contains a table showing 4,104 acres of wetland impacts from the programmatic features. These numbers should be reconciled in the FRPEIS.

Borrow Sources

According to Appendix C of the DRPEIS, borrow material for the proposed project would come from a combination of adjacent and offsite borrow locations. The appendix states that offsite borrow sources would not come from wetland areas, but provides no such commitment with respect to adjacent borrow sources. Indeed, it appears from the figures in Appendix G that some portion of the borrow material for the constructible and programmatic levee features would come from adjacent wetlands.

In order to comply with the Clean Water Act Section 404(b)(1) Guidelines, the USACE would need to demonstrate that there is no less environmentally damaging practicable alternative to using wetlands as a source of borrow material. Page 38 of Appendix C indicates that no less environmentally damaging practicable alternatives to the proposed discharges could be identified. However, there does not appear to be any information to adequately substantiate this claim with respect to the analysis of potentially less environmentally damaging borrow sites. The FRPEIS should include information demonstrating that there are no less environmentally damaging borrow sources for the constructible levee reaches. This same analysis of borrow site alternatives would also be needed for subsequent environmental reviews of the programmatic features. On this point, we would note that the avoidance of jurisdictional wetlands for borrow material is one of the significant environmental accomplishments of the expedited NEPA process for the Greater New Orleans Hurricane and Storm Damage Risk Reduction System. We would encourage the USACE to work to repeat this important precedent.

6.10.2 Air Quality - Action Alternatives, page 6-26

This section states that direct project impacts to ambient air quality will be temporary and localized, primarily due to construction equipment emissions and airborne particulate matter/fugitive dust.

Recommendation:

In addition to all applicable local, state, or federal requirements, the following mitigation measures should be included in a construction emissions mitigation plan or similar document in order to reduce air quality impacts associated with emissions of NOx, CO, PM, SO_2, and other pollutants from construction-related activities:

Fugitive Dust Source Controls:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate at active and inactive sites during workdays, weekends, holidays, and windy conditions;

- Install wind fencing and phase grading operations where appropriate, and operate water trucks for stabilization of surfaces under windy conditions; and
- Prevent spillage when hauling material and operating non-earthmoving equipment and limit speeds to 15 miles per hour. Limit speed of earth-moving equipment to 10 mph.

Mobile and Stationary Source Controls:

- Plan construction scheduling to minimize vehicle trips;
- Limit idling of heavy equipment to less than 5 minutes and verify through unscheduled inspections;
- Maintain and tune engines per manufacturer's specifications to perform at EPA certification levels, prevent tampering, and conduct unscheduled inspections to ensure these measures are followed;
- If practicable, utilize new, clean equipment meeting the most stringent of applicable Federal or State Standards. In general, commit to the best available emissions control technology. Tier 4 engines should be used for project construction equipment to the maximum extent feasible;
- Lacking availability of non-road construction equipment that meets Tier 4 engine standards, the responsible agency should commit to using EPA-verified particulate traps, oxidation catalysts and other appropriate controls where suitable to reduce emissions of diesel particulate matter and other pollutants at the construction site; and
- Consider alternative fuels and energy sources such as natural gas and electricity (plug-in or battery).

Administrative Controls:

- Prepare an inventory of all equipment prior to construction and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking;
- Develop a construction traffic and parking management plan that maintains traffic flow and plan construction to minimize vehicle trips; and
- Identify sensitive receptors in the project area, such as children, elderly, and infirmed, and specify the means by which impacts to these populations will be minimized (e.g. locate construction equipment and staging zones away from sensitive receptors and building air intakes).

6.14.8 Environmental Justice, page 6-41

Page 6-41 states "we have determined that there is no disproportionate impact to a minority or low income community."

EPA strongly disagrees with this statement. There is not adequate information in the DRPEIS to determine how the USACE came to the conclusion that there are no potentially disproportionate impacts to minority and/or low income communities. When one segment of the population benefits from the proposed action, but another absorbs the negative impacts of the action (i.e., increased storm surge and flooding as levee segments are constructed) in addition to historical actions/events (i.e. an already overburdened community), it can create a potentially disproportionate EJ impact. The USACE did not perform an adequate EJ assessment 1) comparing the potential impacts of those inside and outside the levees and 2) comparing the timing of construction with potential increased storm surge and flooding impacts to minority and/or low income communities. The DRPEIS does not fully describe the indirect and cumulative impacts on EJ issues. These communities have experienced negative impacts due to the BP oil spill, floods, hurricanes, and loss of subsistence fishing (including crabs, oysters, shrimp, etc), gathering, and hunting opportunities.

Recommendation:

In addition to our comments regarding obtaining a more accurate estimate of the demographics of the area, the USACE should consider the potential EJ impacts of the timing of levee construction on minority and/or low income populations that may be directly, indirectly, or cumulatively impacted by the proposed action. In order to avoid disproportionate impacts to the Isle de Jean Charles tribal community, any buyout would need to relocate the community intact in an appropriate location with access to subsistence resources and with other attributes agreeable to the tribe. The tribal leader should be contacted immediately to begin appropriate discussions. Although not mentioned in the DRPEIS, USACE should also determine whether the Point au Chien Indian Tribe and United Houma Nation would experience similar potential impacts. As discussed in our Cumulative Impacts comments on page 9, the FRPEIS should include a more thorough cumulative impacts analysis and include those impacts on minority and/low income populations.

6.15 Cultural Resources

The DRPEIS does not provide enough information to determine whether the USACE is in full compliance with National Historic Preservation Act (NHPA), E.O. 12898, and others.

Recommendation:

The USACE should initiate consultation with Tribes regarding NHPA and initiate formal consultation with any federally-recognized Tribes under E.O. 13175 before finalizing the EIS.

6.19 Mitigation

Table 4-1 of the Draft PAC Report includes a reference to marsh impacts from the levee which are “self mitigated”. It is not clear what this means, but it appears to be a reference to the idea that indirect hydrologic effects of the proposed levee project could provide wetland benefits that compensate for wetland impacts due to levee construction. EPA does not support such an assertion, given the uncertainties and challenges of accurately assessing hydrologic impacts from the levee, as well as the potential for long-term adverse impacts due to changes in the operation of the levee system in response to relative sea level rise.

Table 4-4 states that more than 3,000 acres of wetlands would be “displaced” by the preferred alternative. This wording suggests that fully compensating for wetland impacts is a simple endeavor with guaranteed success. We would suggest using more accurate wording such as “permanently eliminated” or “destroyed” instead of “displaced”, followed by the caveat that the USACE will seek to provide full compensatory mitigation to offset such impacts.

Page 6-71 of the DRPEIS states that “In most cases, the establishment of mitigation sites would be done at the same time as construction of the levees and other project features.” This statement is somewhat vague and may fall short of an explicit commitment to provide mitigation in advance of or concurrent with project implementation. For example, what is meant by “establishment of mitigation sites”? And what is meant by “In most cases…”? This statement should be re-written to include a commitment to provide mitigation in advance of or concurrent with project implementation, to the maximum extent practicable. This would ensure consistency with the standard for mitigation timing set forth in the April 10, 2008, Department of Defense and EPA regulations regarding compensatory mitigation for losses of aquatic resources. (According to Section 2036 of the Water Resources Act of 2007, the Secretary shall ensure that the mitigation plan for each water resource project complies with the mitigation standards and policies established pursuant to the regulatory programs administered by the Secretary.)

Mitigation efforts should be developed and described that avoid potential disproportionate impacts of the proposed action that could result in the loss of community cohesion in all of the potentially affected communities south of the proposed levee system, in particular, the tribal community of Biloxi-Chitimacha on Isle de Jean Charles.

8.0 PUBLIC INVOLVEMENT

8.1 Scoping and Interagency Coordination

It appears that the latest project scoping meetings took place in and around May of 1993 in Houma, Louisiana. There is not enough information to determine whether the USACE completed any more recent scoping and other public meetings besides the meeting held in January 2013, and whether communities, tribes, and other stakeholders directly regarding the project were contacted. EPA is concerned that the USACE did not obtain the views and ideas of affected residents and general public when the last record of communication and public involvement occurred almost 20 years ago.

Recommendation:

The FRPEIS should provide documentation of recent scoping and public involvement events and actions. If scoping and public involvement did not take place for this revised action, the USACE should directly and immediately engage all interested, concerned, and affected stakeholders, including low income, minority, and tribal populations, including the Biloxi-Chitimacha tribal community of Isle de Jean Charles, Point au Chien Indian Tribe, and United Houma Nation, before finalizing the EIS.

EPA emphasizes that there is a need for continued interagency coordination on the constructible and programmatic features of the proposed project to ensure that wetland impacts are avoided and minimized in the subsequent NEPA processes. This is particularly the case for those levee reaches that would enclose wetland areas that are currently un-impounded and new portions of the overall levee alignment (e.g., the proposed Lockport to Larose Ridge levee extension).

Letter 34

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
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St. Petersburg, FL 33702
(727) 570-5312; Fax 570-5517
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MAR 18 2002 F/SER3:DLK:mdh

Mr. Nathan Dayan
Planning, Programs, and Compliance Branch
CEMVN-PM-RS
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Mr. Dayan:

This correspondence is in reply to the letter and Draft Feasibility Report (Volume I), received November 29, 2001, and Volumes II and III (including the Biological Assessment), received January 8, 2002, from the U.S. Army Corps of Engineers (Corps), New Orleans District. The feasibility study is for a plan to provide additional protection from hurricane surge flooding for portions of the Terrebonne and Lafourche Parishes in southeast Louisiana. National Marine Fisheries Service (NMFS) comments are rendered pursuant to the Endangered Species Act of 1973 (ESA). The NMFS consultation number for this project is I/SER/2001/01141; please refer to this number in future correspondence on this project.

The proposed project consists of the construction of a system of levees and floodgates designed to provide protection from a 100-year hurricane event. Two versions of the plan have been proposed. The original included 87 miles of levees, 11 floodgates, a lock, 12 fish and wildlife structures, and several drainage structures, while the modified plan has 72 miles of levees and the same number of structures. The strategy is to provide flood control and wetland protection through this project, with its primary feature being a levee/flood wall that starts at the western side of the Terrebonne Parish, traverses the southern portion of the parish, and connects with the south Lafourche hurricane protection system at Larose.

ESA listed species under NMFS' purview which potentially occur in the Gulf of Mexico off Louisiana include: the Gulf sturgeon (*Acipenser oxyrinchus desotoi*); five species of sea turtles including the green (*Chelonia mydas*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), leatherback (*Dermochelys coriacea*), and hawksbill (*Eretmochelys imbricata*); and five species of whales including the northern right (*Eubalaena glacialis*), finback (*Balaenoptera physalus*), humpback (*Megaptera novaeangliae*), sei (*Balaenoptera borealis*), and sperm (*Physeter catodon*).

None of the whale species are expected to be found near the project area. Leatherback and hawksbill turtles are highly unlikely to occur near the project area. The work is going to occur in coastal waters and coastal marsh areas, with construction occurring "several miles from Gulf edge marshes" where it is unlikely that loggerhead, Kemp's ridley or green turtles will occur. There are no nesting beaches in the area that would be impacted directly or indirectly. The construction activity, levees, and floodgates are not planned in Gulf sturgeon spawning sites and should not significantly impact other sturgeon habitat. Based upon this review, NMFS believes that the proposed action is not likely to adversely affect any listed species under NMFS' purview for any of the plan alternatives.

This concludes the Corps' consultation responsibilities under section 7 of the ESA for the proposed actions for federally listed species, and their critical habitat, under NMFS' purview. Consultation should be reinitiated if there is a take, new information reveals impacts of the proposed actions that may affect listed species or their critical habitat, a new species is listed, the identified action is subsequently modified, or critical habitat designated that may be affected by the proposed activity.

Pursuant to the essential fish habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1855(b)(2) and 50 CFR 600.905-.930, Subpart K), the NMFS Habitat Conservation Division (HCD) is being copied with this letter. The HCD biologist for this region is Richard Hartman. If you have any questions about consultation regarding essential fish habitat for this project, please contact Mr. Hartman at (225) 389-0508.

If you have any questions, please contact Dennis Klemm, fishery biologist, at the number above or by e-mail at Dennis.Klemm@noaa.gov.

Sincerely,

for, Joseph E. Powers, Ph.D.
Acting Regional Administrator

cc: F/PR3
F/SER44- R. Hartman

File: 1514-22 f.1 LA
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State of Louisiana

OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT
DIVISION OF ARCHAEOLOGY

JAY DARDENNE
LIEUTENANT GOVERNOR

CHARLES R. DAVIS
DEPUTY SECRETARY

PAM BREAUX
ASSISTANT SECRETARY

February 26, 2013

Ms. Joan M. Exnicios
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Ms. Exnicios:

This in response to your letter dated June 15, 2012, concerning the above referenced Programmatic EIS. First, we apologize for our delayed response. We have reviewed the enclosed documentation and concur that no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate. Therefore, we have no objections to the implementation of this portion of the project. However, the documentation provided does not meet the State of Louisiana's standards for archaeological reports. We would like to receive the proper documentation when the contract for the remaining cultural resources is complete.

We look forward to reviewing the archaeological report for the National Register Testing and Evaluation of site 16TR71 and an uncharacterized shell concentration on Reach E near Falgout Canal. If you have any questions, please contact Rachel Watson in the Division of Archaeology at (225)342-8165 or rwatson@crt.la.gov.

Sincerely,

Pam Breaux

Pam Breaux
State Historic Preservation Officer

PB:RW:s

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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

February 14, 2013

Ms. Joan M Exnicios, Chief
Regional Planning and Environmental Division South
New Orleans District Environmental Branch
U.S. Army Corps of Engineers
CEMVN-PDN-CEP
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

NOAA's National Marine Fisheries Service (NMFS) has reviewed the Post Authorization Change Report and draft revised programmatic environmental impact statement (RPEIS) for the Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana Project. The RPEIS assesses potential impacts to the environment associated with hurricane and storm damage risk reduction for portions of Terrebonne and Lafourche Parishes. The transmittal letter indicates the draft RPEIS represents the U.S. Army Corps of Engineers' (USACE) initiation of essential fish habitat (EFH) consultation under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

The tentatively selected plan (TSP) consists of storm risk reduction for water levels having a one percent chance of occurring annually. Features for the TSP include 98 miles of levees, 22 floodgates, and 23 environmental water control structures. Approximately 85 miles of the proposed levees in part overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing local levees. Earthen levees would be constructed with adjacent and/or hauled in borrow. Marsh creation mitigation is proposed to be constructed adjacent to the levees utilizing organic overburden soils which are unacceptable for levee foundation. The USACE's intent is for the RPEIS to have sufficient detail and impact analyses to designate some features as "constructible" and requiring no subsequent National Environmental Policy Act disclosure. The constructible features identified include: (1) levee reaches F1, F2, and G1, (2) the Houma Navigation Canal (HNC) Lock Complex; and (3) the Bayou Grand Caillou (BGC) floodgate.

Contrary to statements and details in the RPEIS, indirect impacts for both the programmatic and constructible features are unknown. NMFS does not concur with the RPEIS statements that: (1) a levee project would benefit estuarine-dependent marine fisheries or EFH, (2) there would be no indirect impacts to enclosed wetlands, or, (3) impacts, whether direct or indirect, are self-mitigating. Direct impacts resulting from construction are presently estimated to be 645 acres of tidal wetlands from constructible features and 3,413 acres of tidal wetlands from programmatic features. For constructible direct impacts, the USACE proposes 916 acres of marsh creation. Neither the indirect impacts nor their offsetting mitigation have yet to be quantified for either the constructible or programmatic features of this project.

To be clear, NMFS does not object to hurricane protection to reduce risks to life or property; however, we do have environmental concerns with the process proposed and described in the RPEIS. The RPEIS provides insufficient information, incomplete impact assessments, and inadequate descriptions of mitigation. Consequently, NMFS requests additional information be included in the Final RPEIS and/or Record of Decision (ROD). The enclosed comments identify areas of concern and where additional information is necessary.

In addition, section 305(b)(4)(A) of the Magnuson-Stevens Act requires NMFS provide EFH conservation recommendations for any federal action which may result in adverse impacts to EFH. Therefore, NMFS recommends the following to ensure the conservation of EFH and associated marine fishery resources:

EFH Conservation Recommendations

1. Impacts, including frequency and duration of closure for all water control structures, should be assessed for reasonably foreseeable future actions. Such an analysis should include operation for non-storm closures at +2.5 ft. NAVD88 at low, intermediate, and high sea level rise scenarios.

2. Indirect impacts should be determined for constructible and programmatic features through coordination with NMFS and other interested natural resource agencies. System-wide modeling should be conducted on features and structure sizes included in the TSP to complete impact assessments. Modeling results of the low sea level rise scenario at the end of the project life should be included in the final RPEIS.

3. A clarified operation plan for the HNC lock, floodgates, and environmental water control structures should be developed through coordination with NMFS and other natural resource agencies. Those operation plans should be clarified to show:

    a. The environmental water control structures along Falgout Canal in Reach E1 would be operated to discharge fresh water southward only.
    b. The BG C floodgate would remain open during the HNC lock saltwater closure periods.
    c. Operation plans for floodgates and water control structures, excluding the Falgout Canal environmental water control structures and the HNC lock, would maximize the open cross sectional area as often and long as possible.

4. An adequate mitigation plan for constructible and programmatic features should be developed to offset updated direct and indirect impacts through coordination with NMFS and other interested natural resource agencies. The mitigation should consist of marsh creation in open water on the flood side of the proposed levee. The mitigation should be planned, fully funded, and implemented in a concurrent timely manner such that functional and temporal losses of EFH are offset. Revised mitigation details should be made available for public and agency review and comment prior to issuing the Final RPEIS or signing the ROD. Specific mitigation details we recommend be included in the Final REIS include:

   a. Final sizing of mitigation
   b. The specific limits of constructible mitigation features
   c. Spill boxes should be directed into adjacent deteriorating marsh to the greatest extent practicable.
   d. Construction staging areas should be located to avoid impacts to wetlands.
   e. Target fill elevations should be based upon a determination of average healthy marsh in the vicinity of the mitigation project in accordance to bio-benchmark surveying methods used for restoration programs. The version of geoid height model used when selecting target elevations should be documented. Target elevations and monitoring elevation data should be presented with the same geoid height model correction.

5. An acceptable gapping/degrading plan for containment dikes constructed for marsh creation mitigation should be included through developmental coordination with NMFS. General design for dike gapping should include:

   a. If total dike degradation is not feasible, one 25-ft gap (bottom width) every 500 ft. is recommended. Depth of gap is dependent on if it is into open water or adjacent marsh. If into open water, gaps should be to the pre-project water depth. If gaps lead into marsh, gap should be to average marsh elevation.
   b. If scour aprons are included, the bottom should be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.
   c. Degraded material should be placed on adjacent remaining dikes and not marsh.
   d. Field adjustments in spacing and dimension based on developing site conditions should be accomplished through coordination with NMFS.

6. Performance standards, monitoring requirements, long-term management, and the adaptive management plan should be revised to be consistent with those currently under development for the Greater New Orleans Hurricane Surge Damage Risk Reduction System.

7. The USACE should remain responsible for mitigation until the mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria. An acceptable adaptive management plan should be developed through coordination with NMFS and other interested natural resource agencies to cover operation and maintenance of the levees and structures, and mitigation. Sufficient appropriated funds should be set aside to fulfill the plan especially as it relates to mitigation compliance.

Consistent with Section 305(b)(4)(B) of the Magnuson-Stevens Act and NMFS' implementing regulation at 50 CFR 600.920(k), the USACE is required to provide a written response to our EFH conservation recommendations within 30 days of receipt. If the USACE's response is inconsistent with our EFH conservation recommendations, the USACE must provide a substantive discussion justifying the reasons for not implementing the recommendations. If it is not possible to provide a substantive response within 30 days, the USACE should provide an interim response to NMFS, to be followed by the detailed response. The detailed response should be provided in a manner to ensure that it is received by NMFS at least 10 days prior to the final approval of the action (i.e., signing of the ROD).

NMFS appreciates the opportunity to review the RPEIS and remains committed to working with the USACE to resolve issues. If you have questions regarding the above or attached comments, please contact Patrick Williams at 225-389-0508, (extension 208) for assistance.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

Enclosures

cc:

COE, New Orleans District, Dayan
FWS, Lafayette, Paille, Walther
EPA, Ettinger
LDWF, Bourgeois, Hebert
LA DNR, Consistency, Lovell
F/SER46, Swafford
F/SER4, Dale, Rolfes
NOAA PPI, Nunenkamp
Files

ENCLOSURE 1

NOAA's National Marine Fisheries Service (NMFS) Comments on the Draft Revised Programmatic Environmental Impact Statement (RPEIS) entitled "Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana"

NMFS understands submittal of the RPEIS for our review represents the U.S. Army Corps of Engineers' (USACE) intent to initiate essential fish habitat (EFH) consultation as required by provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Our response is submitted in accordance with section 600.920(i)(4) of the EFH rules and regulations and includes whether sections of the RPEIS adequately fulfill the requirements of an EFH assessment.

General Comments

As conceived, analyzed and disclosed, this storm damage risk reduction project was intended to keep structures open the majority of the time with the exception for storm events that risk life or property. As a result, open or "leaky" levee descriptors for the project were developed. However in response to future sea level rise predications, it is probable structures would have to be closed more frequently and for a longer duration over the project life. As closures increase in frequency and duration, substantial socio-economic and environmental risks would likely result. Such impacts should be disclosed in the Final RPEIS.

Operation plans, direct and indirect impact assessments, and mitigation are primary natural resource topics of concern with the RPEIS. NMFS believes resolution of issues associated with these matters is necessary to complete an acceptable environmental impact statement and to develop an appropriate mitigation plan.

Operation/Impacts

Clarity of the operation plan for the Tentatively Selected Plan (TSP) is lacking and impact assessments are incomplete. Information necessary to complete impact analyses have not been provided. Enclosure 2 is a list of information needs to help complete an impact assessment. Items listed in Enclosure 2 have been identified by the draft Fish and Wildlife Coordination Act Report (CAR) and through electronic mail correspondence from the Habitat Evaluation Team (HET) with staff of the USACE.

The operation plan for the project is unclear. The Post-Authorization Change (PAC) Report and RPEIS both are internally inconsistent to determine if the structures would be operated under storm conditions to protect from storm flooding only, or also under non-storm conditions to protect from tidal flooding. The frequency and duration of structure closures in the future and the associated impacts to the environment would change drastically, if the system was operated to reduce non-storm related flooding. No discussion of likely impacts related to non-storm closures is included in the RPEIS. However given predictions of sea level rise, NMFS believes it is reasonably foreseeable that the structures would be operated in the future under non-storm conditions to protect from tidal flooding.

As an example, permits have been issued to the non-Federal sponsor and construction is underway on a number of levee reaches authorized to close structures whenever water levels reach +2.5 ft. NAVD88. The non-Federal sponsor has acknowledged publically the frequency of closing existing structures has increased over time. Further, the USACE predicts in the RPEIS that based on the +2.5 ft. NAVD88 closure at the end of the project life, the HNC floodgate to be closed 168, 354, and 365 days per year under the low, intermediate, and high sea level rise scenarios, respectively. The expectation of future operation for non-storm closures at +2.5 ft. NAVD88 has been established with ongoing operations, funds, and permit authority. Therefore, NMFS recommends the Final RPEIS include an assessment of likely impacts of sea level rise on the frequency and duration of water control structure closures under storm and non-storm operations and include environmental impacts from these reasonably foreseeable actions. Assessments based on increasing amount and length of structure closures should also include socio-economic impacts to communities within the proposed levee system which have cultural and economic dependency on water-dependent commerce.

The TSP is the one percent Annual Exceedence Probability Alternative, which includes 125-ft wide sector gates in the Gulf Intracoastal Waterway (GIWW) both west of Houma and at Larose. Prior to release of the PAC Report and draft RPEIS, the sector gates at both of those locations were to be 175-ft wide. Accordingly, the system-wide hydrology and hydraulic modeling conducted to assess environmental impacts and assist in project design was run with the 175-ft wide sector gates. Therefore, the accuracy and usefulness of presently available modeling to assess impacts from the TSP is questionable. A smaller GIWW sector gate west of Houma may influence flows and associated freshwater distribution west of, and within, the levee system and may elevate salinities inside and south of the levee system. In order to assess the environmental impacts of the TSP, the model should be rerun with the 125-ft wide sector gates in both GIWW locations as included in the TSP. The updated impact analysis should be coordinated with the HET and included in the Final RPEIS. Figures throughout the RPEIS depicting salinity projections for the TSP should be updated in the Final RPEIS accordingly. Alternatively, the number of sluice gates in both GIWW structures could be increased in the TSP to ensure flows are not impacted and presently available modeling results are applicable.

NMFS does not concur enclosing wetlands behind levees would benefit marsh or estuarine-dependent marine fishery resources. Prior to the 2002 PEIS, system-wide modeling was determined to be a necessity to assess impacts of this project. Once system-wide model results were made available in December 2012, the HET concluded indirect impacts for both constructible and programmatic features must be evaluated. Impact analyses and associated conclusions in the RPEIS are represented as if they are final, while the analyses are actually preliminary and subject to change based on pending modeling results. Furthermore, the sizes of the GIWW sector gates in the TSP were reduced after the modeling. Therefore, the presently available modeling is not of the actual TSP. System-wide modeling should be conducted with the TSP-sized GIWW sector gates and consider non-storm closures in the future with sea level rise. Indirect and cumulative impacts to wetlands, fisheries, and EFH likely would result from potential degradation of water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine dependent fishery species' access to nursery and foraging habitat.

Indirect and cumulative impacts to wetlands, fisheries, and EFH, as well as the mitigation necessary to offset such impacts should be discussed in the Final RPEIS prior to signature of the ROD. Conclusions of: (1) benefits to marsh and estuarine dependent fisheries, (2) the project being self-mitigating, or, (3) lack of impacts to hydrology from enclosure within a levee system should be removed where stated throughout the document (e.g., PAC Report Table 4-1, RPEIS Sections 6.5.2 Indirect, 6.16.12 Indirect Impacts, and Appendix C). Those sections of the RPEIS should be revised based upon pending indirect impact assessments once necessary data are made available by the USACE.

Mitigation

The mitigation plan proposed for constructible and programmatic features is unacceptable as drafted in the RPEIS. NMFS believes the amount of mitigation is indeterminable at this time because impact assessments are incomplete. Sidecast disposal of overburden material on existing marsh should not be considered as mitigation. In addition, the mitigation plan is incompletely developed for the identified constructible features.

Section 6.19 and maps in Appendix G of the RPEIS indicate mitigation construction for constructible features would consist of filling existing wetlands and open water from near continuous sidecast disposal of organic overburden unsuitable for the levee foundation. Fill placement impacting existing marsh is unacceptable as mitigation. The locations and amount of fill placement in open water to create marsh as mitigation exclusively for the constructible features is not specified or substantiated with a functional based analysis. The only mitigation analyses conducted by the HET to determine the amount of mitigation necessary, evaluated marsh creation in open water constructed by hydraulic dredging. Because this included no fill on existing marsh, development of wetland functions were projected accordingly. Therefore, the only results available thus far did not evaluate the USACE's currently proposed mitigation and no analyses have been undertaken to quantify performance over the life of the project. NMFS recommends marsh creation be conducted in open water areas only and the siting and sizing of the mitigation areas be coordinated with the HET and substantiated with a functional based analysis.

The quantification of mitigation necessary to offset indirect impacts is contingent upon the reasonably foreseeable non-storm operation plan and modeling of the frequency and duration of closures. Signature of the ROD should be held in abeyance until issues related to mitigation for both direct and indirect impacts are resolved, in particular for the constructible features, through coordination with NMFS.

NMFS finds the "12 items" required by the 2008 mitigation regulations are insufficient as included in the RPEIS. The mitigation plan in Section 6.19 and cost details related to financial assurances in Appendix G need updating based on revised mitigation design, sizing, siting, and performance and monitoring provisions.

EFH Assessment

Based on our review of the RPEIS, we have determined that although the document contains the four items required of an EFH assessment, the details in those items are insufficient. An EFH assessment includes an analysis of effects, including mitigation, to determine the net and cumulative impact to EFH. NMFS finds TSP impacts have not been quantified at this time. Therefore, the amount of compensatory mitigation is unknown and the net effects on EFH are undeterminable. However, we acknowledge project effects on EFH could be offset, if impacts are adequately quantified and a sufficient acreage of tidally influenced marsh is created in open water. Such cannot be accomplished until indirect impacts are determined for reasonably foreseeable operation including non-storm closures.

Fish and Wildlife CAR

NMFS provided comments on the draft CAR on January 8, 2013. Those comments should be addressed and resolved through coordination with NMFS prior to proceeding to the final RPEIS. When corrected impact analyses are available, a final CAR should be prepared. Recommendations in the final CAR should be resolved in the Final RPEIS.

Specific Comments

Unresolved Issues Section.

Triggers for closing structures are unclear. Although the USACE's intent may be to close structures only under storm conditions (whether named or un-named storms), departure from the present level of protection and operation would be a significant change for the non-Federal sponsor. This section should be revised to disclose that water control structure operation over the project life is an unresolved issue.

Table 1-1.

The Magnuson-Stevens Act should be added under the Federal Statutes section.

Section 3.11.3 Coastal Wetlands Planning, Protection and Restoration Act

The North Lake Boudreaux Project (TE-32a) should be added to the list of CWPPRA projects in the study area. The project is sponsored by the U.S. Fish and Wildlife Service.

Section 4.3.8 Operation of Structures

The draft RPEIS and PAC Report are inconsistent regarding operation plans for the floodgates and environmental water control structures. "Section 1.0 Summary, Purpose" stipulates hurricanes and storms exclusively, and "Section 4.3.8 Operation of Structures" stipulates closures at +2.5 ft. NAVD88 is restricted to named tropical storms for the HNC lock, floodgates, and environmental water control structures. However, Sections 7.4.4 of the PAC Report and 4.3.8.4 of the RPEIS indicate structures would be closed as outlined in recent permits including closures when water levels approach +2.5 ft. NAVD88 for "other extreme tidal events", which would be non-storm events. Section 4.3.8.5 of the RPEIS and 7.4.5 of the PAC Report discuss adapting operations for sea level rise and predict closures for the HNC floodgate at 168 days, 354 days, and 365 days per year by the year 2085 based upon low, intermediate, and high sea level rise scenarios for the +2.5-ft closure exclusively. Therefore, NMFS recommends the documents be revised throughout to include the potential for non-storm operation and to evaluate likely impacts of such actions on resources of concern.

Section 4.3.8.1 Operation of the HNC Lock Complex

Data are needed to complete impact assessments. The closure trigger is identified as, "If a gage on the outside of the HNC Lock exceeds a salinity value that has been correlated with preventing exceedance of the maximum allowable chloride level…"; however, it does not identify the specific salinity trigger, thereby leaving impacts indeterminable until specified. Opening is identified as occurring once salinity falls below 13 parts per thousand at Cocodrie. There are limited to no salinity data presently available from the Cocodrie gage to determine the likely frequency of closure of the lock based on salinity triggers. The USACE should provide the exact closure and opening triggers, the locations where they are measured, and sufficient salinity data on which to base impact projections. For post construction operations and monitoring purposes, a salinity gage should be established on the flood side of the HNC.

Section 4.3.9 Mitigation

To compensate for impacts to marsh, NMFS prefers marsh creation (i.e., fill placement in open water) on the flood side of the proposed levee. The map details in Appendix G are generic concepts. The design, location, and amount of mitigation have not been coordinated with the interagency HET and are in need of substantial revision both for programmatic and constructible features, as well as to offset direct and indirect impacts. Marsh creation in open water should be the primary focus and filling existing marsh should be avoided. Also, the layout of the mitigation should be revised to avoid altering hydrology and impeding flow from environmental water control structures under Falgout Canal Road in Reach E-1. A thorough analysis of direct and indirect impacts of the constructible features should be completed and this section of the Final RPEIS should be revised by including corrected plats identifying the specific limits for the mitigation work. Construction access corridors, staging areas, and borrow areas to supplement any shortfalls from sidecast disposal of organic overburden should be identified and discussed. Any dedicated dredging borrow sites to create marsh should be sited and designed to avoid inducing erosion (e.g., wave or slope-failure) of existing marsh bank lines. If borrow is expected from bayous, the borrow sites should be segmented with undredged reaches to serve as under water plugs to minimize saltwater intrusion. The borrow areas should be designed to minimize adverse impacts to water quality to the extent practicable. The implications of borrow sites on water quality should be discussed. The USACE is encouraged to include dissolved oxygen monitoring to assess if impacts occur and to identify the potential need to alter borrow designs in the future. These matters should be resolved and discussed in the Final RPEIS and ROD.

Section 4.4 Comparison of Environmental Consequences of Alternatives
Table 4-4.

For the one percent and three percent alternatives, wetland impacts in the table should be revised from "displaced" to "destroyed". Impacts to aquatic habitat, fisheries, and EFH should be revised to include indirect impacts from increasing closures of floodgates and water control structures. The Hydrology section should be augmented to indicate localized increases in flooding and salinity are expected on the protected and flood side of the levees and to provide a description of where that is projected to occur.

Section 5.2.4 Fisheries

This section should be expanded to include a description of the existing marsh management projects, their operation, and limitations structural marsh management have on estuarine-dependent fishery species. This information previously was provided to staff of the USACE for consideration in the system-wide modeling and is available again, upon request.

Section 5.2.5 Essential Fish Habitat

Gulf stone crab and gray snapper should be removed from the discussion and Table 5-7.

Section 6.1 Environmental Consequences Introduction and Appendix F.

These sections should be expanded to make clear the period of analysis captures temporal losses of wetland function from the time impacts occur from levee construction until functional mitigation is achieved. The starting and ending points of the period of analysis by levee reach and mitigation would illustrate how temporal losses are considered. In addition, the USACE should clarify if the end year to calculate the amount of sea level rise included in the system-wide modeling was 2085 and included years 2004 to 2015. This section acknowledges constructed CWPPRA projects are within the project area, but does not describe how they are handled in the impact assessment or Appendix F on the Wetland Value Assessment analysis. This section should be revised to discuss potential impacts to CWPPRA constructed restoration projects.

Section 6.2.2 1% AEP Alternative Direct Impacts

A table and discussion should be added disclosing a breakdown of wetland impacts by habitat type.

Section 6.5.1.2 1% AEP Alternative

This section indicates direct impacts would be minimized with the use of Best Management Practices (BMP); however, no description or reference to the BMPs are provided. The document should be revised to include BMPs or to indicate supplemental National Environmental Policy Act documents will disclose BMPs.

Section 6.5 Fisheries

The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control structure closures on estuarine-dependent fishery resources.

Table 6.3

The information pertaining to Reach F should be revised. Specifically, the HNC Lock is projected to be closed frequently due to salinity and storm provisions, which would limit fisheries access north of the lock to Bayou Grand Caillou. Further, the levee alignment eliminates access from the HNC into the Bayou Platte drainage area from its drainage point south near Deep Bayou. Fisheries access with Reach K in place would not be improved over existing conditions because water control structures already allow fisheries access into the marsh management units on the Point aux Chenes Wildlife Management Area.

Section 6.6 EFH

NMFS does not concur with the impact assessments to EFH. Indirect and cumulative impacts are incomplete at this time. Impacts presented were based on preliminary and in progress assessments. Indirect and cumulative impacts to EFH should be assessed and described in the Final RPEIS based on revised system-wide modeling for the TSP and include foreseeable non-storm structure closures. The amounts of flooding and salinity changes have not been substantiated at this time and cannot be concluded as minimal. BMPs are not defined. The EFH section should include acres of open water impacted. Revised analysis should assess potential impacts to water quality, ponding stress on wetland vegetation, and reduction or elimination of estuarine fisheries access with increases in structure closures in the future.

Section 6.14 Socioeconomics

The direct, indirect, and cumulative impact sections need revision. These sections should include impacts based on the projected frequency and duration of structure closures in the future under the three sea level rise scenarios and under storm and non-storm operations. These sections should specifically describe the likely impacts of frequent and extended water control structure closures on navigation to ports and marinas enclosed within the project area. In addition, this section should evaluate how storm water drainage will be accomplished in the future with various sea level rise projections.

Section 6.19 Mitigation

NMFS finds the mitigation plan is unacceptable for constructible features and for programmatic considerations for reasons discussed both above and below.

Section 6.19.4 Wetland Mitigation Plan for Constructible Features

The method to convert from impact Average Annual Habitat Units (AAHUs) to mitigation acres is not disclosed and has not been coordinated with the HET. The acreage of necessary mitigation can be determined based upon the mitigation potential (AAHUs/acre) by type of mitigation project. The mitigation potential provides an initial scaling that must be refined based upon a final WVA conducted on Preliminary Engineering and Design (PED) level information for the mitigation. PED level information for the constructible feature mitigation has not been disclosed and therefore final scaling to ensure a one to one functional replacement is not possible at this time.

Table 6-5

This table presents the 12 components of the compensatory mitigation plan. Some of those items are incomplete and/or unacceptable. Site selection for marsh creation in many reaches overlaps existing marsh, which itself could require separate mitigation actions. NMFS is concerned the layout of the mitigation sites may be presently determined based on the need for sidecast disposal of overburden and not the best layout to compensate for lost ecological services. In addition, the USACE has not conducted an analysis of how such a use of overburden will perform over the life of the project. For the final RPEIS, the site plan should be revised substantially by relocating all overburden disposal and marsh creation to open water areas only, and to include an analysis of likely performance over the life of the project.

The mitigation work plan should be resolved through coordination with the natural resource agencies to resize the mitigation sites after they have been relocated to open water to ensure adequate compensation is provided. Draft marsh creation work plans developed for the Greater New Orleans Hurricane Surge Damage Risk Reduction System (HSDRRS) should be used for the Morganza to the Gulf Project. Greater specificity and clarity commensurate with constructible features are provided in the HSDRRS performance, success, and monitoring/reporting criteria. Because it was only developed for fresh, intermediate, and brackish marsh, the HSDRRS mitigation work plan should be expanded to address needs for salt marsh mitigation associated with the Morganza to the Gulf Project. In addition, performance standards, monitoring requirements, long-term management plan, and adaptive management provisions should be revised to be consistent with the most current standards developed for HSDRRS.

Section 6 of this table discusses access corridors, construction staging areas, and target elevations. Regarding target elevations, this section recommends use of geotechnical analyses and elevations surveys to determine appropriate target elevation ranges. No specific plans have been disclosed for the constructible features mitigation. Settlement curves and survey data have not been provided to substantiate the mitigation plan for the constructible features. Detailed plats identifying the limits of the constructible feature mitigation including access corridors and staging areas have not been disclosed. The vegetation section is unclear as to whether marsh vegetation would be planted. If plantings are proposed, then clarification is needed on what species would be planted and when planting would occur under the proposed plan.

Section 8 of this table discusses performance standards. Inclusion of a gapping plan is noted and appreciated. However, we request the spacing and gap dimensions in the plan be revised to increase potential tidal function. Also, a provision should be included for field adjustments in spacing for site conditions. The final RPEIS should be revised throughout to indicate gapping/degrading would occur manually rather than dependent on sufficient erosion and settlement of dikes over time. The basis for the proposed target (initial and settled) fill elevation for the marsh creation site is not provided. Target elevations should be based upon a determination of average healthy marsh in the vicinity of proposed mitigation sites. It is recommended those elevations be determined by surveys in accordance to bio-benchmark survey protocols used for marsh creation designs under restoration programs. That methodology includes:

> Average marsh elevation (NAVD88) should be determined from no less than three locations in the vicinity of a mitigation project. The marsh surface is reached when the survey rod is resting among living stems or is supported by soil containing living roots. In order to get a consistent reading, it may be necessary to cut vegetation stems where stem density is extremely high. A minimum of 20 elevations (each separated by 20 to 40 ft.) at each of the sites should be required for this determination.

The vertical datum, monuments and version of geoid height model can introduce differences in the reported target and monitoring elevations. Elevations measured during the design surveys and all monitoring should indicate the geoid height model used and be corrected to the same geoid if it differs during the monitoring period to ensure like comparisons.

The proposed duration of the construction phase is unclear. The USACE should remain responsible for marsh mitigation until such mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria.

Section 11 of this table discusses an Adaptive Management Plan. This section specifies corrective actions if openings do not develop in a "continuous breakwater." A "continuous breakwater" is not a component of the project and that statement should be deleted from the text. In addition, this section should be revised to include gapping of marsh creation containment dikes.

Section 12 of this table discusses financial assurances and describes responsible parties, but not the amount of financial assurances. The amount should be developed based on the acreage of mitigation, operations, and monitoring to ensure sufficient funds are programmed to accomplish the mitigation. Furthermore, funds (contingency or otherwise) should be included to ensure completion of the Adaptive Management Plan.

Appendix F

The dollar amounts listed relate to the amount of funds necessary for financial assurance to complete mitigation. It is unclear if the dollar amounts for monitoring are estimated based upon the scope of details in Table 6-5. Dollar amounts included for mitigation construction and monitoring should be revised based on necessary revisions to the mitigation plan consistent with HSDRRS.

ENCLOSURE 2

NOAA's National Marine Fisheries Service (NMFS) Comments on the Draft Revised Programmatic Environmental Impact Statement (RPEIS) entitled "Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana" - Preliminary List of Pending Information Needed to Complete Impact Analyses

1. Operation Plan
    a. Operation for non-storms
    b. Verification of the elevation trigger for closures
    c. Determine the frequency and duration of structures closures both under storm and non-storms conditions at +2.5 ft. NAVD88 in the future under the low, intermediate, and high sea level rise scenario; reconcile differences projected by the USACE and the U.S. Fish and Wildlife Service
    d. HNC Lock salinity closure criteria should be established
    e. HNC Lock opening criteria needs to be defined for a location outside of the lock
    f. Determine when structures on the southeast side of the project area would be closed more frequently
    g. Operation for water control structures in the constructible features should be provided

2. Data Needs
    a. Determination by the USACE if the system-wide model results based on 175-ft wide sector gates in the GIWW remain valid for the TSP that has 125-ft wide gates
    b. System-wide model runs for the TSP (i.e., 125-ft sector gates in the GIWW structures)
    c. Stage data needed for locations other than HNC at Dulac
    d. Need salinity data under low sea level rise at the end of the project life (e.g., system-wide modeling of Future Without Project, Plan1, and Plan3, under low SLR scenario at the end of the project life)
    e. Tidal exchange flux or equivalent from system-wide model (re: WVA Variable 6, Average Tidal Flux method)
    f. Salinity data for HNC opening criteria to assess if data are available to base 1) a 13 ppt opening criteria and 2) measured at Bayou Petite Caillou at Cocodrie is feasible

3. Impact Analyses
    a. Updated indirect impacts based upon non-storm operation in the future under the three sea level rise scenarios
    b. Updated indirect impacts based upon 125-ft sector gates in the GIWW structures and revise all indirect and cumulative impacts.
    c. Assess the frequency of the +2.5 ft. NAVD88 threshold on the SE side of the project area

d. Updated impacts based on the HNC lock operation for the closure and opening criteria
e. AdH without-project baseline salinities are low consider TABS baseline salinities
f. Complete revisions for fish access, Variable 6
    i. Resolve Method(s) selection
    ii. Assigning values under selected method(s)
    iii. FWOP values for existing marsh management structures

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

MARCH 25, 2013

REPLY TO
ATTENTION OF

Regional Planning and
Environmental Division, South
Environmental Planning Branch

Virginia M. Fay, Assistant Regional Administrator
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Southeast Regional Office
263 13th Avenue, South
St. Petersburg, FL 33701-5505

Dear Ms. Fay:

Please reference your consultation letter dated February 14, 2013 under the Magnuson-Stevens Fishery Conservation and Management Act providing Essential Fish Habitat (EFH) conservation recommendations on the draft revised programmatic environmental impact statement (RPEIS) for the Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana Project.

The U. S. Army Corps of Engineers, New Orleans District appreciates your input and provides the enclosed responses to NOAA's EFH conservation recommendations.

If you have any questions or require additional information please contact Mr. Nathan Dayan at U.S. Army Corps of Engineers; Regional Planning and Environmental Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Mr. Dayan can also be reached at (504) 862-2530 or by email at nathan.s.dayan@usace.army.mil.

Sincerely,

Sandra Stiles
for
Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

Copies Furnished
NMFS Baton Rouge office
USFWS

NMFS EFH Conservation Recommendations

NMFS Recommendation: Impacts, including frequency and duration of closure for all water control structures, should be assessed for reasonably foreseeable future actions. Such an analysis should include operation for non-storm closures at +2.5 ft. NA VD88 at low, intermediate, and high sea level rise scenarios.

USACE Response: In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" would be included in the Final RPEIS.

NMFS Recommendation: Indirect impacts should be determined for constructible and programmatic features through coordination with NMFS and other interested natural resource agencies. System-wide modeling should be conducted on features and structure sizes included in the TSP to complete impact assessments. Modeling results of the low sea level rise scenario at the end of the project life should be included in the final RPEIS.

USACE Response: For the programmatic features, the Final RPEIS will include a qualitative analysis of indirect and cumulative impacts. The Final RPEIS will better explain the potential near-term and long-term indirect hydrologic impacts of the proposed levee on wetlands and other significant resources (wetlands, fisheries, water quality, navigation, etc). RPEIS will describe what the adverse impacts to each of these resources could be under different sea level rise scenarios. Re-analysis would consider the types and number of floodgates and control structures present in levee design; how structures would be operated; how structures could affect fish access and how structures could affect recruitment of commercially and recreationally important aquatic species. For the constructible features, the HET has run full WVAs for 4 scenarios to give a possible range of AAHU impacts: (1) Intermediate RSLR holding closure existing condition closure frequency constant into the future (2) High RSLR holding existing condition closure frequency constant into the future (3) Intermediate RSLR & more frequent closures in the future. (4) High RSLR & more frequent closure in the future. Currently, the system wide model cannot address RSLR. If the project is re-authorized, additional system wide modeling can be conducted to quantify RSLR impacts.

NMFS Recommendation: A clarified operation plan for the HNC lock, floodgates, and environmental water control structures should be developed through coordination with NMFS and other natural resource agencies. Those operation plans should be clarified to show:

- a. The environmental water control structures along Falgout Canal in Reach E 1 would be operated to discharge fresh water southward only.
- b. The BG C floodgate would remain open during the HNC lock saltwater closure periods.

c. Operation plans for floodgates and water control structures, excluding the Falgout Canal environmental water control structures and the HNC lock, would maximize the open cross sectional area as often and long as possible.

USACE Response: In coordination with the HET, USACE and non-Federal sponsors refined the structure operation plan closure criteria assumptions for storm surge and salinity criteria to the point where the HET agreed that indirect impacts could be assessed. This revised "Operation Plan" will be included in the Final RPEIS.

NMFS Recommendation: An adequate mitigation plan for constructible and programmatic features should be developed to offset updated direct and indirect impacts through coordination with NMFS and other interested natural resource agencies. The mitigation should consist of marsh creation in open water on the flood side of the proposed levee. The mitigation should be planned, fully funded, and implemented in a concurrent timely manner such that functional and temporal losses of EFH are offset. Revised mitigation details should be made available for public and agency review and comment prior to issuing the Final RPEIS or signing the ROD. Specific mitigation details we recommend be included in the Final REIS include:

a. Final sizing of mitigation
b. The specific limits of constructible mitigation features
c. Spill boxes should be directed into adjacent deteriorating marsh to the greatest extent practicable.
d. Construction staging areas should be located to avoid impacts to wetlands.
e. Target fill elevations should be based upon a determination of average healthy marsh in the vicinity of the mitigation project in accordance to bio-benchmark surveying methods used for restoration programs. The version of geoid height model used when selecting target elevations should be documented. Target elevations and monitoring elevation data should be presented with the same geoid height model correction.

USACE Response: The mitigation plan proposed for the constructible elements of the project has been revised. It now accounts for mitigation of both direct and indirect habitat impacts and contains specific limits of proposed mitigation features, which consist of marsh restoration (creation) features located in open water areas on the flood side of the proposed levee system. These revisions were coordinated with the HET. This revised plan now also addresses your comments "a" through "e". However, this revised plan does not yet identify specific staging areas, borrow sites, and construction access corridors, nor are the target marsh elevations based on field surveys of nearby healthy marshes. The revised mitigation plan for the constructible elements would be included in the final RPEIS and can be reviewed during the 30-day state and agency review period. Further refinements to this mitigation plan would occur during the PED phase in close coordination with the HET, other PDT members, and the non-Federal Sponsors. During this phase: survey data would be gathered to establish marsh target elevations in accordance with your recommendation; spill box locations would be identified; staging areas would be located to avoid wetland impacts to the extent practicable; borrow sites and construction access corridors would be located to avoid wetland impacts to the extent practicable. More specific mitigation plans for habitat impacts associated with the programmatic project elements would be prepared as part of future supplemental NEPA documents.

NMFS Recommendation: An acceptable gapping/degrading plan for containment dikes constructed for marsh creation mitigation should be included through developmental coordination with NMFS. General design for dike gapping should include:

a. If total dike degradation is not feasible, one 25-ft gap (bottom width) every 500 ft. is recommended. Depth of gap is dependent on if it is into open water or adjacent marsh. If into open water, gaps should be to the pre-project water depth. If gaps lead into marsh, gap should be to average marsh elevation.
b. If scour aprons are included, the bottom should be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.
c. Degraded material should be placed on adjacent remaining dikes and not marsh.
d. Field adjustments in spacing and dimension based on developing site conditions should be accomplished through coordination with NMFS.

USACE Response: Engineering design criteria would be refined with consideration of your suggestions and coordinated with NMFS and the other resource agencies. This will be clearly documented in the final RPEIS. Note that the revised mitigation plan for the constructible elements of the project may not require any "gapping" of temporary retention (containment) dikes since all such dikes would be manually degraded to equal the final target elevations of the proposed marsh restoration features where practicable without causing adverse impacts. This approach will be documented in the final RPEIS.

NMFS Recommendation: Performance standards, monitoring requirements, long-term management, and the adaptive management plan should be revised to be consistent with those currently under development for the Greater New Orleans Hurricane Surge Damage Risk Reduction System.

USACE Response: The proposed mitigation plan for impacts associated with the constructible elements of the project was revised to be more consistent with the current Greater New Orleans HSDRRS mitigation standards you mention. The adaptive management plan has been revised consistent with applicable laws, regulations and policy. More detailed mitigation performance standards, monitoring requirements, long-term management activities, and adaptive management plans would be developed during PED phase of constructible elements as well as provided in future supplemental NEPA documents prepared for the programmatic elements of the project. The revised plans will be contained in the final RPEIS.

NMFS Recommendation: The USACE should remain responsible for mitigation until the mitigation is demonstrated to be compliant with success and performance criteria. At a minimum, this should include compliance with the requisite vegetation, elevation, acreage, and gapping criteria. An acceptable adaptive management plan should be developed through coordination with NMFS and other interested natural resource agencies to cover operation and maintenance of the levees and structures, and mitigation. Sufficient appropriated funds should be set aside to fulfill the plan especially as it relates to mitigation compliance.

USACE Response: The USACE will execute its responsibilities, consistent with all applicable laws, regulations and policies, regarding mitigation compliance, adaptive management and monitoring, and funding consistent. This would include, but is not limited to meeting vegetation, elevation, acreage, gapping and other developed performance standards and criteria for the mitigation plan. The USACE will coordinate with the NMFS and other resource agencies for development of more detailed mitigation, adaptive management and monitoring plans during the PED phase for constructible project features as well as during future development of programmatic project features. In accordance with WRDA 2007 Section 2036 and 2039 the project has developed a monitoring and adaptive management for the mitigation plan not the entire project. The project is not required to develop monitoring and adaptive management for the other project features included since it is not an ecosystem restoration project. In accordance with the project's statutory authority, the proposed mitigation actions will include construction, with the Non-Federal Sponsor (NFS) responsible for operation, maintenance, repair, restoration, and rehabilitation (OMRR&R) of functional portions of work as they are completed. On a cost-shared basis, USACE will monitor completed mitigation to determine whether additional activities (ex. further construction efforts, additional plantings, etc.) are necessary to achieve mitigation success. USACE will undertake additional actions necessary to achieve mitigation success in accordance with cost-sharing applicable to the project and subject to the availability of funds. Once USACE determines that the mitigation has achieved specified initial success criteria, monitoring & maintenance would be performed by the NFS as part of its OMRR&R obligations. If, after meeting initial success criteria, the mitigation fails to meet subsequent success criteria, USACE will consult with other agencies, including NMFS and the NFS to determine whether operational/management changes would be sufficient to achieve ecological success criteria.

Mitigation plans for compensating habitat impacts associated with the programmatic project elements would be provided in future supplemental NEPA documents. These mitigation plans would include AMPs if necessary and would be developed by USACE in coordination with NMFS, other interested resource agencies, the Project Delivery Team (PDT), and the NFS.

An Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) Manual will be prepared by USACE for completed habitat mitigation elements. Preparation of this document would be coordinated with NMFS, other resource agencies, the PDT, and the NFS. It will cover an array of mitigation topics including, but not necessarily limited to; monitoring and reporting requirements, success criteria, maintenance/management/operational requirements and guidelines, and applicable AMPs. The final mitigation OMRR&R Manual will be provided to the NFS once USACE transfers mitigation responsibilities to the NFS.

The USACE will prepare Water Control Plans (WCPs) regarding the operation of proposed levee system structures that control water movement/flows and will provide such WCPs to the NFS upon construction completion of levee reaches. The proposed project may include water control structures that are integral to the success of proposed habitat mitigation features and/or whose proper operation is critical to avoiding, minimizing, or mitigating potential adverse impacts to Essential Fish Habitats or fisheries resources. In such cases, preparation of the WCP would be coordinated with NMFS, other appropriate resource agencies, the PDT, and the NFS.

The Project Partnership Agreement between the NFS and the Federal Government provides the required financial assurance for the proposed mitigation. In the event that the NFS fails to perform, the USACE has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature, including mitigation features, but such action would not relieve NFS of its responsibility to meet its obligations and would not preclude the USACE from pursuing any remedy at law or equity to ensure the NFS's performance.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
3737 Government Street
Alexandria, LA 71302

(318) 473-7751
Fax: (318) 473-7626

January 4, 2013

Joan Exnicious
DOA
P.O. Box 60267
New Orleans, LA 70160-0267

RE: Mississippi River & Tributaries – Morganza to the Gulf of Mexico, Louisiana

Dear Ms. Exnicious:

I have reviewed the above referenced project for potential requirements of the Farmland Protection Policy Act (FPPA) and potential impact to Natural Resource 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 submitted with your request indicates that the proposed construction areas will not impact prime farmland and therefore is exempt from the rules and regulations of the Farmland Protection Policy Act (FPPA)—Subtitle I of Title XV, Section 1539-1549. 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/

Please direct all future correspondence to me at the address shown above.

Respectfully,

Sarah Haymaker

Kevin D. Norton ACTING FOR
State Conservationist

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Ms. Rhonda Smith
EPA, Region VI - Off. of Planning and
Coord. / Mail Code 6EN-XP
1445 Ross Avenue
Dallas, TX 75202-2733

Dear Ms. Smith:

A draft revised programmatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, Louisiana, project prepared by the U.S. Army Corps of Engineers, New Orleans District is available for your review.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Mr. Gary Zimmerer
FEMA - Region VI, Federal Center
800 North Loop 288
Denton, TX 76201-3698

Dear Mr. Zimmerer:

A draft revised programmatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, Louisiana, project prepared by the U.S. Army Corps of Engineers, New Orleans District is available for your review.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Melvin C. Mitchell, Sr.
Louisiana Dept. of Env. Quality
Water Quality Certifications Section
P.O. Box 4313
Baton Rouge, LA 70821-4313

Dear Mr. Mitchell, Sr.:

An application for a State Water Quality Certificate, prepared by the U.S. Army Corps of Engineers, New Orleans District (MVN) is enclosed. MVN staff request that a water quality certification be completed, pursuant to Section 401 of the Clean Water Act of 1977, as amended (33 U.S.C., Section 1341). A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

To the best of our knowledge any dredge/fill material will be free of contaminants. Please provide the public notice for publication in the Advocate of Baton Rouge to the person listed below, as soon as possible. In addition to sending us a hard copy of the public notice documents, we request that you send a complete electronic copy via E-Mail to nathan.s.dayan@usace.army.mil.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Mr. Keith Lovell
Interagency Affairs - LADNR
Field Services Division
P.O. Box 44487, Capital Station
Baton Rouge, LA 70804-4487

Dear Mr. Lovell:

A draft revised programmatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, Louisiana, project prepared by the U.S. Army Corps of Engineers, New Orleans District is available for your review. We request your concurrence with the enclosed Consistency Determination, which addresses the applicable Coastal Use Guidelines. Based on the enclosed information, we believe that the proposed action is consistent, to the maximum extent practicable, with the State of Louisisana's approved Coastal Resources Program.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

David Bernhart
NMFS - Protected Species Division
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Coordination of The Endangered Species Act was accomplished with U.S. Fish and Wildlife Service (FWS) staff. U.S. Fish and Wildlife Service staff concurred with our finding that the proposed activities would not significantly affect listed or proposed threatened or endangered species at the time of the 2002 report. A reconcurance is being requested of FWS per this report.

As part of the ESA Section 7 consultation process associated with the 2002 feasibility report, the NMFS concluded, by letter of March 18, 2002 (Appendix H), " . . .the proposed action is not likely to adversely affect any listed species under NMFS' purview for any of the plan alternatives."

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Mr. Richard D. Hartman
NMFS - Habitat Conservation Division
Louisiana State University
Baton Rouge, LA 70803-7535

Dear Mr. Hartman:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

The enclosed RPEIS represents MVN's initiation of essential fish habitat consultation as required under the Magnuson-Stevens Fishery Conservation and Management Act.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

January 03, 2013

Regional Planning and
Environment Division, South

Kevin Norton
State Conservationist - NRCS
3737 Government Street
Alexandria, LA 71302

Dear Mr. Norton:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Mr. Michael Trusclair
NRCS District Conservationist
Boutte Field Office
P.O. Box 531
Boutte, LA 70039

Dear Mr. Trusclair:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Mr. Phil Boggan
SHPO, Dept. of Culture
Recreation and Tourism
P.O. Box 44247
Baton Rouge, LA 70804

Dear Mr. Boggan:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

January 03, 2013

Regional Planning and
Environment Division, South

Jeff Weller
Field Supervisor
U.S. Fish and Wildlife Service
646 Cajundome Blvd - Suite 400
Lafayette, LA 70506

Dear Mr. Weller:

A draft revised programatic environmental impact statement (RPEIS) for the MISSISSIPPI RIVER & TRIBUTARIES-MORGANZA TO THE GULF OF MEXICO, LOUISIANA, project prepared by the U.S. Army Corps of Engineers, New Orleans District is enclosed for your review and comment.

Coordination of The Endangered Species Act was accomplished with a finding that the proposed activities would not significantly affect listed or proposed threatened or endangered species. Concurrence with this finding was received from your office for the 2002 report. We reques a reconcurrence per this letter.

Please review the enclosed documents and provide comments within 45 days of the date that the notice is published in the Federal Register. Comments should be mailed to the attention of Mr. Nathan Dayan; 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, Louisiana 70160-0267.

Comments may also be provided by E-Mail to Morganza.Comments@usace.army.mil, or by fax to (504) 862-2088. Mr. Dayan may be contacted at (504) 862-2530, if questions arise.

Sincerely,

Joan M. Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch
Regional Planning and Environment Division, South

JAY DARDENNE
LIEUTENANT GOVERNOR

State of Louisiana
OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF CULTURAL DEVELOPMENT
DIVISION OF ARCHAEOLOGY

CHARLES R. DAVIS
DEPUTY SECRETARY

PAM BREAUX
ASSISTANT SECRETARY

February 26, 2013

Ms. Joan M. Exnicios
Department of the Army
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Ms. Exnicios:

This in response to your letter dated June 15, 2012, concerning the above referenced Programmatic EIS. First, we apologize for our delayed response. We have reviewed the enclosed documentation and concur that no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate. Therefore, we have no objections to the implementation of this portion of the project. However, the documentation provided does not meet the State of Louisiana's standards for archaeological reports. We would like to receive the proper documentation when the contract for the remaining cultural resources is complete.

We look forward to reviewing the archaeological report for the National Register Testing and Evaluation of site 16TR71 and an uncharacterized shell concentration on Reach E near Falgout Canal. If you have any questions, please contact Rachel Watson in the Division of Archaeology at (225)342-8165 or rwatson@crt.la.gov.

Sincerely,

Pam Breaux
Pam Breaux
State Historic Preservation Officer

PB:RW:s

P.O. BOX 44247 • BATON ROUGE, LOUISIANA 70804-4247
PHONE (225) 342-8170 • FAX (225) 342-4480 • WWW.CRT.LA.GOV/ARCHAEOLOGY

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

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: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Ms. Breaux:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

Currently, USACE has prepared a Programmatic Environmental Impact Statement (PEIS) in compliance with the National Environmental Policy Act (NEPA) outlining the continuing development of specific knowledge for different reaches of the entire MtoG levee. This EIS specifies that further Environmental Assessments (EA) will be prepared to discuss any potential environmental impacts as each new levee reach is prepared for construction. Your office will receive separate notice of the availability of this PEIS from USACE. The Corps has utilized the many cultural resources studies referenced above to gain general and specific understanding of potential cultural resources impacts within the MtoG as it is currently known, and has completed cultural resources investigation for the constructible features that are outlined in the PEIS for immediate construction. These constructible features include Reaches F1, F2, G1, the Houma Navigational Canal Lock Complex, and the Bayou Grand Caullou Floodgate. The Corps will continue with cultural resources surveys that include not only the remaining levee alignments that have not yet received cultural resources survey, but also any borrow areas and any mitigation areas (related to NEPA requirements) as the specifics of such are better identified.

The Corps has a current cultural resources survey contract with Goodwin and Associates, Inc. (RCGA) for survey of the constructible features presented in the PEIS, as well as some other areas. Because this contract is not complete, no draft report has yet been prepared. However, a letter report (Boyko 2012) has been prepared to present the findings of the field survey for the constructible features, and concludes that no cultural resources are affected. This letter report is included with this letter, for your knowledge of progress and development with the Morganza to Gulf project.

The Corps concludes that the constructible features examined by RCGA and presented in the PEIS will have no impacts to cultural resources. The PEIS discusses the broad outline of remaining future developments to bring protection to people and property and resources located in Terrebonne and Lafourche parishes. We ask that you provide any comments within 30 days. Please contact Dr. Paul Hughbanks at (504) 862-1100 if you have any questions.

Sincerely,

G. DeMarcay

for Joan M. Exnicios
Chief, New Orleans Environmental Branch

Enclosure

Boyko, Wayne C. J.
2012 *Update on the Cultural Resource Investigations for Morganza to the Gulf, Hurricane Protection Extending Through Terrebonne and LaFourche Parishes in Southeast Louisiana, Constructible Features, Phase I Cultural Resources Survey of Reaches F1, F2, G1, the Houma Navigational Canal Lock Complex, and the Bayou Grand Caillou Floodgate and National Register Testing and Evaluation at Site 16TR71 and an Uncharacterized Shell Concentration on Reach E near Falgout Canal.* R. Christopher Goodwin and Associates, Inc., New Orleans, Louisiana for the United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana.

Brown, Clifford T., Dave D. Davis, Julian Granberry, Roger Saucier, Lynn A. Berg, Christine Herman, J. Cinder Griffin Miller, Jeremy Pincoske, Susan Barrett Smith, Patrick P. Robblee, and William P. Athens
2000 *Morganza to the Gulf Feasibility Study: Cultural Resources Literature and Records Review, Terrebonne and Lafourche Parishes, Louisiana (Volume I and II)*. Report prepared by R. Christopher Goodwin and Associates, Inc., New Orleans, Louisiana for the United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana. (22-2133)

Moreno, Meredith A., Susan Barrett Smith, Dave D. Davis, and R. Christopher Goodwin
2011 *Phase Ia Literature Search and Records Review of Previously Recorded Cultural Resources Located within the Proposed Areas Associated with the Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.* Report prepared by R. Christopher Goodwin and Associates, Inc., New Orleans, Louisiana for the United States Army Corps of Engineers, New Orleans District, New Orleans, Louisiana. (22-3291)

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Principal Chief Carlos Bullock
Alabama Coushatta Tribe of Texas
571 State Park Road 56
Livingston, Texas 77351

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chief Bullock:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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included with this letter, for your knowledge of progress and development with the Morganza to Gulf project.

The Corps concludes that the constructible features examined by RCGA and presented in the PEIS will have no impacts to cultural resources. The PEIS discusses the broad outline of remaining future developments to bring protection to people and property and resources located in Terrebonne and Lafourche parishes. We ask that you provide any comments within 30 days. Please contact Dr. Paul Hughbanks at (504) 862-1100 if you have any questions.

Sincerely,

Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Mr. Bryant J. Celestine, Historic Preservation Officer

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chairperson Brenda Shemayme Edwards
Caddo Nation of Oklahoma
P.O. Box 487
Binger, Oklahoma 73009

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chairperson Edwards:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

for G DeMarcay

Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Mr. Robert Cast, Historic Preservation Officer

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chairman John Paul Darden
Chitimacha Tribe of Louisiana
P.O. Box 661
Charenton, Louisiana 70523

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chairman Darden:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

for Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Ms. Kimberly S. Walden, Cultural Director

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Dr. Ian Thompson
Tribal Historic Preservation Officer
Choctaw Nation of Oklahoma
P.O. Box Drawer 1210
Durant, Oklahoma 74702-1210

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Dr. Thompson:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

Currently, USACE has prepared a Programmatic Environmental Impact Statement (PEIS) in compliance with the National Environmental Policy Act (NEPA) outlining the continuing development of specific knowledge for different reaches of the entire MtoG levee. This EIS specifies that further Environmental Assessments (EA) will be prepared to discuss any potential environmental impacts as each new levee reach is prepared for construction. Your office will receive separate notice of the availability of this PEIS from USACE. The Corps has utilized the many cultural resources studies referenced above to gain general and specific understanding of potential cultural resources impacts within the MtoG as it is currently known, and has completed cultural resources investigation for the constructible features that are outlined in the PEIS for immediate construction. These constructible features include Reaches F1, F2, G1, the Houma Navigational Canal Lock Complex, and the Bayou Grand Caullou Floodgate. The Corps will continue with cultural resources surveys that include not only the remaining levee alignments that have not yet received cultural resources survey, but also any borrow areas and any mitigation areas (related to NEPA requirements) as the specifics of such are better identified.

The Corps has a current cultural resources survey contract with Goodwin and Associates, Inc. (RCGA) for survey of the constructible features presented in the PEIS, as well as some other areas. Because this contract is not complete no draft report has yet been prepared. However, a letter report (Boyko 2012) has been prepared to present the findings of the field survey for the constructible features, and concludes that no cultural resources are affected. This letter report is

included with this letter, for your knowledge of progress and development with the Morganza to Gulf project.

The Corps concludes that the constructible features examined by RCGA and presented in the PEIS will have no impacts to cultural resources. The PEIS discusses the broad outline of remaining future developments to bring protection to people and property and resources located in Terrebonne and Lafourche parishes. We ask that you provide any comments within 30 days. Please contact Dr. Paul Hughbanks at (504) 862-1100 if you have any questions.

Sincerely,

M DeMarcay

for Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chief Kevin Sickey
Coushatta Tribe of Louisiana
P.O. Box 818
Elton, Louisiana 70532

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chief Sickey:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

GJ DeMarcay
for Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Miss Bertney Langley, Cultural Contact

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Principal Chief B. Cheryl Smith
Jena Band of the Choctaw Indians
P.O. Box 14
Jena, Louisiana 71342

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Principal Chief Smith:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

DeMarcay

for Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Dana Masters, Tribal Historic Preservation Officer

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chief Phyllis J. Anderson
Mississippi Band of Choctaw Indians
P.O. Box 6257
Choctaw, Mississippi 39350

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chief Anderson:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

for Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Mr. Kenneth H. Carleton, Historic Preservation Officer

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chairman John Berrey
Quapaw Tribe of Oklahoma
P.O. Box 765
Quapaw, Oklahoma 74363

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chairman Berrey:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

DeMarcay
for
Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Jean Ann Lambert, Historic Preservation Officer

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Principal Chief Leonard M. Harjo
Seminole Nation of Oklahoma
P.O. Box 1498
Wewoka, Oklahoma 74884

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Principal Chief Harjo:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Ms. Natalie Deere, Tribal Historic Preservation Officer

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

JUN 15 2012

Regional Planning and
Environmental Division, South
New Orleans Environmental Branch

Chairman James Billie
Seminole Tribe of Florida
6300 Sterling Road
Hollywood, Florida 33024

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chairman Billie:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

for
Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Paul N. Backhouse, Acting Tribal Historic Preservation Officer

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

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
Environmental Division, South
New Orleans Environmental Branch

JUN 15 2012

Chairman Earl J. Barbry, Sr.
Tunica-Biloxi Tribe of Louisiana
P.O. Box 1589
Marksville, Louisiana 71351

Re: Programmatic EIS Constructible Features for Morganza to the Gulf Hurricane Protection Project, Terrebonne and Lafourche Parishes, Louisiana.

Dear Chairman Barbry:

The U.S. Army Corps of Engineers, New Orleans District (USACE), has been involved for many years in developing the Morganza to the Gulf Hurricane Protection Project (MtoG) in order to protect low lying populated areas of Terrebonne and Lafourche Parishes, Louisiana. Numerous reports and correspondence, involving background research, probability models, and field work, have been coordinated with the Louisiana State Historic Preservation Officer (SHPO) and with your office as the project has developed, from approximately 1997 (Brown et al. 1997) until the present day (Moreno et al. 2011).

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Sincerely,

Joan M. Exnicios
Chief, Environmental Planning
and Compliance Branch

Copy Furnished:
Mr. Earl Barbry, Jr., Cultural Director

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

The RPEIS is a revision to the 2002 Final Programmatic EIS for the project, which was not finalized with the signing of a Record of Decision. A revision is required because project alternatives have been modified as a result of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

Although programmatic in nature, this RPEIS has sufficient details and impact analyses for some features so that construction can proceed on those features. The four features that are expected to be identified as constructible include: Levee Reach F1 and F2, Levee Reach G1, the HNC lock complex, and the Bayou Grand Caillou Floodgate. The remaining components of the

project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions 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 with the 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

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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:

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project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions, 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 with the 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

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

The RPEIS is a revision to the 2002 Final Programmatic EIS for the project, which was not finalized with the signing of a Record of Decision. A revision is required because project alternatives have been modified as a result of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

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As always, should you have any questions, 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 with the enclosures will be provided to Ms. Kimberly Walden, M. Ed., Cultural Director, Chitimacha Tribe of Louisiana, kswalden@chitimacha.gov.

Sincerely,

Joan M Exnicios

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:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

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CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

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As always, should you have any questions about the proposed undertaking, 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 with the enclosures will be provided to Mr. 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

Enclosures

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

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project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions about the proposed undertaking, 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 with the enclosures will be provided to Dr. Linda Langley, THPO, Coushatta Tribe of Louisiana, lllangley@mcneese.edu, and Mr. Michael Tarpley, Deputy THPO, Coushatta Tribe of Louisiana, kokua.aina57@gmail.com.

Sincerely,

Joan M. Exnicios

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:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

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A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions about the proposed undertaking, 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 with the 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

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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As always, should you have any questions about the proposed undertaking, 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 with the 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

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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As always, should you have any questions about the proposed undertaking, 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 with the enclosures will be provided to Ms. Jean Ann Lambert, Tribal Historic Preservation Officer, Quapaw Tribe of Oklahoma, jlambert@quapawtribe.com.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, Environmental Planning Branch

Enclosures

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

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project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions about the proposed undertaking, 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 with the 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

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

March 5, 2013

Regional Planning and
Environment Division, South

James Billie, Chairman
Seminole Tribe of Florida
6300 Stirling Road
Hollywood, FL 33024

Dear Chairman Billie:

The U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

The RPEIS is a revision to the 2002 Final Programmatic EIS for the project, which was not finalized with the signing of a Record of Decision. A revision is required because project alternatives have been modified as a result of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

Although programmatic in nature, this RPEIS has sufficient details and impact analyses for some features so that construction can proceed on those features. The four features that are expected to be identified as constructible include: Levee Reach F1 and F2, Levee Reach G1, the HNC lock complex, and the Bayou Grand Caillou Floodgate. The remaining components of the

project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions about the proposed undertaking, 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 with the enclosures will be provided to Mr. Paul N. Backhouse, Tribal Historic Preservation Officer, Seminole Tribe of Florida, paulbackhouse@semtribe.com; Ms. Anne Mullins, Project Coordinator, annemullins@semtribe.com; and 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

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:

March 5, 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 U.S. Army Corps of Engineers, New Orleans District (CEMVN), has prepared a draft Revised Programmatic Environmental Impact Statement (RPEIS) for the Mississippi River and Tributaries – Morganza to the Gulf of Mexico, Louisiana project to evaluate the potential impacts to the environment associated with the proposed Morganza to the Gulf of Mexico, Louisiana hurricane and storm damage risk reduction project in Terrebonne and Lafourche parishes. The RPEIS is available for your review and comment.

The RPEIS is a revision to the 2002 Final Programmatic EIS for the project, which was not finalized with the signing of a Record of Decision. A revision is required because project alternatives have been modified as a result of new hurricane and storm damage risk reduction design guidelines issued after hurricanes Katrina and Rita.

The project is located approximately 60 miles southwest of New Orleans, Louisiana, and includes most of Terrebonne Parish, excluding the barrier islands, and the portion of Lafourche Parish between the Terrebonne Parish eastern boundary and Bayou Lafourche. A project fact sheet is enclosed.

The tentatively selected plan would include the construction of 98 miles of earthen levee, approximately 85 miles of which would overlay existing hydrologic barriers such as natural ridges, roadbeds, and existing levees. The remaining levee alignment would be constructed in unprotected coastal wetlands. Construction would include 22 floodgates on navigable waterways, including the Houma Navigation Canal (HNC) lock complex, and 23 environmental water control structures designed to allow tidal exchange through the levee. The structural features would be integrated into the levee alignment to provide hurricane and storm damage risk reduction, drainage, and navigational passage.

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project are programmatic features that will require additional NEPA investigations before construction can occur.

CEMVN concluded that "the constructible features will have no impacts to cultural resources," and this finding was coordinated with the Louisiana State Historic Preservation Officer (SHPO) and federally-recognized Tribes on June 15, 2012. In the enclosed letter dated February 26, 2013, the SHPO concurred that "no historic properties were identified within the constructible features of Reaches F1, F2, G1, the Houma Navigation Canal Lock Complex and the Bayou Grand Caillou Floodgate," and as such "have no objections to the implementation of this portion of the project." Site 16TR71 and the uncharacterized shell concentration on Reach E near Falgout Canal referenced in the SHPO letter are not within the Area of Potential Effects for the constructible features, and Section 106 consultation will continue as additional features are planned for construction.

In an effort to continue government-to-government consultation 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 described in the draft RPEIS to significantly affect protected tribal resources, tribal rights, or Indian lands.

A copy of the draft RPEIS is available online at http://1.usa.gov/ZVel3A. Please contact Mr. Nathan Dayan; U.S. Army Corps of Engineers; Regional Planning and Environment Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267; to request a hard copy. Requests may also be made by email to Nathan.S.Dayan@usace.army.mil or by phone to (504) 862-2530.

As always, should you have any questions about the proposed undertaking, 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 with the 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

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

March 28, 2013

Ms. Joan Exnicios
Regional Planning and Environmental Division South
New Orleans District Environmental Branch
U.S. Army Corps of Engineers
CEMVN-PDN-CEP
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Ms. Exnicios:

NOAA's National Marine Fisheries Service (NMFS) has received your letter dated March 25, 2013, pertaining to the U.S. Army Corps of Engineers' (USACE) draft revised programmatic environmental impact statement (RPEIS) for the Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana Project.

By letter dated February 14, 2013, NMFS provided comments to the USACE on the draft RPEIS including seven essential fish habitat (EFH) conservation recommendations pursuant to consultation under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). In abbreviated summary, the EFH conservation recommendations requested: (1) reassessment of indirect impacts for constructible and programmatic features included in the Tentatively Selected Plan; (2) development of a clarified operation plan including non-storm closures; and, (3) development of a complete and adequate mitigation plan with reconciliation of the items included in the final RPEIS prior to signing the Record of Decision (ROD).

The USACE's March 25, 2013, letter provided responses to our EFH conservation recommendations. By electronic mail on March 25 and March 26, 2013, revisions to Section 6.19 and Appendix K for the final RPEIS pertaining to mitigation were transmitted to NMFS as additive information to supplement the USACE's March 25th response. A revised operation plan was prepared with the Non-Federal Sponsor and the USACE committed to a qualitative assessment of programmatic indirect impacts. Also, there was a commitment to quantitatively assess indirect impacts for constructible features, which since have been completed. However, there has been limited quality assurance/quality control review due to time constraints required by the USACE. The USACE has agreed to incorporate explanations in the final RPEIS of the indirect impacts on wetlands, fisheries, water quality, and navigation including the degree those impacts would vary under different sea level rise scenarios. Due to the rapid rate of revisions with limited review, NMFS recommends any discrepancies or inconsistencies identified be corrected at the time of discovery leading up to signature of the ROD or subsequently during the Preliminary Engineering and Design (PED).

The overall mitigation plan, specifically the type and acres proposed for impacts from both constructible and programmatic features, is now a substantial improvement from the 2002 PEIS and the 2013 draft RPEIS. Notably, the USACE has committed in the revisions to constructing marsh mitigation for indirect impacts for constructible features. NMFS appreciates this substantive step. Acknowledging uncertainty, a range of indirect impacts for constructible features were projected based on different operation plans and sea level rise scenarios. At this time, the USACE has scaled mitigation to offset the middle of the range of impacts projected. Because of the uncertainty of indirect impacts, NMFS is willing to revisit the indirect impacts and correspondingly scaled mitigation for constructible features, if information becomes available to justify a change.

The revised mitigation plan descriptions acknowledge if a source for additional fill, other than organic overburden excavated from the levees and the lock, is needed to construct the marsh creation mitigation then additional borrow areas will be identified later. NMFS recommends the ROD commit to supplemental environmental clearance if additional borrow areas not presently identified in the draft RPEIS are deemed necessary during the PED phase.

Due to the ecosystem level of potential project impacts, continued early and often coordination with NMFS is requested through future phases of the project. Given the USACE commitments summarized above, our EFH conservation recommendations have been satisfactorily addressed at this time. This satisfies the consultation procedures outlined in 50 CFR Section 600.920, the regulation to implement the EFH provisions of the Magnuson-Stevens Act. Assuming the project is not further revised, this concludes the consultation requirements pursuant to the EFH regulations of the Magnuson-Stevens Act.

Thank you for your staff endeavoring to resolve matters at the local level. We appreciate the efforts of your staff to address our concerns on this project. Please provide a copy of the final RPEIS and signed ROD to our Baton Rouge Field Office for their files.

Sincerely,

Virginia M. Fay

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

c:
COE, New Orleans District, Dayan
FWS Lafayette, Paille, Walther
EPA, Ettinger
LDWF, Bourgeois, Hebert
LA DNR, Consistency, Lovell
F/SER46, Swafford
F/SER4, Dale, Rolfes
F/SER, Keys, Silverman
NOAA PPI, Nunekamp
Files

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

March 25, 2013

Regional Planning and
Environmental Division, South
Environmental Planning Branch

Jeff Weller, Field Supervisor
U.S. Fish and Wildlife Service
646 Cajundome Blvd - Suite 400
Lafayette, LA 70506

Dear Mr. Weller:

Please reference your letter dated February 14, 2013 providing comments on the draft revised programmatic environmental impact statement (RPEIS) for the Mississippi River and Tributaries-Morganza to the Gulf of Mexico, Louisiana Project. The USACE appreciates your input. The following statement has been added to the final PEIS and Biological Assessment.

It is the USACE determination that there would be No Affect to Threatened or Endangered Species or their critical habitat due to the Morganza to the Gulf Risk Reduction Project.

We are seeking your concurrence with this determination. If you have any questions or require additional information please contact Mr. Nathan Dayan at U.S. Army Corps of Engineers; Regional Planning and Environmental Division South; Environmental Planning Branch; CEMVN-PDN-CEP; P.O. Box 60267; New Orleans, Louisiana 70160-0267. Mr. Dayan can also be reached at (504) 862-2530 or by email at nathan.s.dayan@usace.army.mil.

Sincerely,

Sandra Stiles
for
Joan M. Exnicios
Chief, Environmental Planning Branch

Appendix I

WATER QUALITY CERTIFICATE

BOBBY JINDAL
GOVERNOR

PEGGY M. HATCH
SECRETARY

State of Louisiana
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

MAR 2 5 2013

U.S. Army Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Attention: Nathan Dayan

RE: Water Quality Certification (WQC 031021-01/AI 90947/CER 20130001)
Morganza to the Gulf Hurricane & Storm Damage Risk Reduction Project
Revised Programmatic Environmental Impact Statement
Terrebonne Parish

Dear Mr. Dayan:

The Department has reviewed your draft revised programmatic environmental impact statement (RPEIS) to construct the Morganza to the Gulf hurricane and storm damage risk reduction project.

Based on the information provided in the application, the Department made a determination that the requirements for a Water Quality Certification have been met and concludes that the placement of the fill material will not violate water quality standards of Louisiana as provided for in LAC 33:IX.Chapter 11.

If you have any questions, please call Jamie Phillippe at 225-219-3225.

Sincerely,

Scott Guilliams

Scott Guilliams
Administrator
Water Permits Division

SG/jjp

Post Office Box 4313 • Baton Rouge, Louisiana 70821-4313 • Phone 225-219-3181 • Fax 225-219-3309
www.deq.louisiana.gov

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 into 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 Planning Division South
CEMVN-PDN-CEP
P.O. Box 60267
New Orleans, LA 70160-0267 ATTN: *Nathan Dayan*

9. AGENT'S ADDRESS

7. APPLICANT'S PHONE NOS. W/AREA CODE

a. Residence

b. Business (504) 862-2530

10. AGENT'S PHONE NOS. W/AREA CODE

a. Residence

b. Business

11. STATEMENT OF AUTHORIZATION

The study is authorized by: House Resolution, Docket 2376, April 30, 1992; and WRDA 96 (PL 104-303, Sec 425) the Energy and Water Development Appropriation Act of 1995 (PL 103-316), Section 425 of WRDA 96 (PL 104-303), Section 158 of the Energy and Water Development Appropriations Act, 2004 (PL 108-137), and Section 1001 of WRDA 2007 (Public Law 110-114) authorized construction for the project for:

> *hurricane and storm damage reduction, Morganza to the Gulf of Mexico, Louisiana: Reports of the Chief of Engineers dated August 23, 2002, and July 22, 2003, at a total cost of $886,700,000, with an estimated Federal cost of $576,355,000and an estimated non-Federal cost of $310,345,000. The operation, maintenance, repair, rehabilitation, and replacement of the Houma Navigation Canal lock complex and the Gulf Intracoastal Waterway floodgate features of the project described in subparagraph (A) that provide for inland waterway transportation shall be a Federal responsibility in accordance with section 102 of the Water Resources Development Act of 1986 (33 U.S.C. 2212).*

The Post Authorization Change (PAC) report and Revised Programmatic Environmental Impact Statement have been prepared.

Sandra Stiles, Ch Coastal Env. Section   3/26/13
APPLICANT'S SIGNATURE   *DATE*

NAME, LOCATION AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Mississippi River and Tributaries Morganza to the Gulf of Mexico, Louisiana Project

13. NAME OF WATERBODY, IF KNOWN (if applicable)

Multiple – Houma Navigation Canal, Bayou Black, GIWW, Bayou du Large, Bayou Grand Caillou, Bayou Terrebonne, Bayou Petit Caillou, Bayou Blue, Bayou Petit Caillou, Lake Boudreaux, Grand Bayou, Sweet Water Pond, etc

14. PROJECT STREET ADDRESS (if applicable)

See attached figure

15. LOCATION OF PROJECT

Terrebonne	Louisiana
COUNTY	*STATE*

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN, (see instructions)

See attached figure

17. DIRECTIONS TO THE SITE

See attached figure

18. Nature of Activity (Description of project, include all features.)

1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative) provides risk reduction for water levels that have a 1% chance of occurring each year (see figure). This alternative includes programmatic elements that would be further investigated in the future and constructible elements for which this water quality application is requested. The features that have been to be identified as constructible include, Levee Reach F1 and F2, Levee Reach G1, HNC Lock Complex (HNC Lock), and Bayou Grand Caillou Floodgate (BGC floodgate).

The 98-mile levee system would extend from high ground along US 90 near the town of Gibson and tie into Highway 1 near Lockport, LA in Lafourche Parish. Planned levee elevations range from 15.0 to 26.5 feet NAVD88. Toe-to-toe levee widths range from 282 feet to 725 feet. Twenty-two navigable floodgate structures, ranging in elevation from 17.0 to 33 feet (NAVD88), would be located on waterways throughout the levee system, including a lock complex on the HNC. Additionally, environmental water control structures would allow tidal exchange at 23 locations through the levee through sluice gates and box culverts.

Nine road gates would be located at the following levee/road crossings: NAFTA, Four Pointe Road, Highway 315 (DuLarge), Highway 55, Highway 56, Hwy 24, Hwy 3235, Union Pacific RR and Highway 665. Fronting protection would be provided for four pumping stations, including the Madison, Pointe aux Chenes, Elliot Jones (Bayou Black), and Hanson Canal pump stations.

Levees would be constructed using a combination of sidecast and hauled-in borrow materials. Adjacent side cast was planned for the pre-load section only. Borrow pits are oversized to offset the potential for encountering organics, expected losses, etc. The project would involve constructing 22 navigable floodgates, 23 environmental water control structures, six road gates, and fronting protection for four existing pumping stations. Structures on Federally maintained navigation channels include the Houma Navigation Canal Lock Complex (and 250-ft sector gate) and two 125-ft sector gates on the GIWW east and west of Houma. In addition, thirteen 56-ft sector gates and five 20- to 30-ft stop log gates are located on various waterways that cross the levee system.

19. Project Purpose (Describe the reason or purpose of the project, (see instruction.)

The purpose of this project is to provide hurricane and storm damage risk reduction for the communities located within the levee system. The goal is to maximize the number of residential and commercial structures protected from damage caused by hurricane storm surges.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

To build a levee system and required compensatory mitigation.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Years.

Approximate 126 million cubic yards of earthen material (quality based on post-Katrina standards) would be used to build the complete levee alignment to its full height.

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

The constructible components of the 1% AEP Alternative would result in the filling of brackish and intermediate marshes and their conversion to uplands and open water. Table 6-1 summarizes the acres affected by the project's constructible and programmatic features.

Acres of Wetlands Directly Effected

Features	Tidal Wetlands	Force Drained Wetlands	Total wetlands
Constructible Features	644.35	25.98	670.33
Programmatic Features*	3,017	31	3,048
Total Impact	3,661	57	3,718

23. Is Any Portion of the Work Already Complete? Yes _X____ No _____ IF YES, DESCRIBE THE COMPLETED WORK

Reach J1 was built covered in EA-406 and Water Quality Certificate #TR 031021-01 / AI 90947 / CER 2003000

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list.

Multiple

25. List of Other Certifications or Approvals/Denials Received from other Federal, State or Local Agencies for Work Described in This Application.

AGENCY	***TYPE APPROVAL***	***IDENTIFICATION NO.***	***DATE APPLIED***	***DATE APPROVED***	***DATE DENIED***

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.

Sandra Stiles	3/23/12		
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.

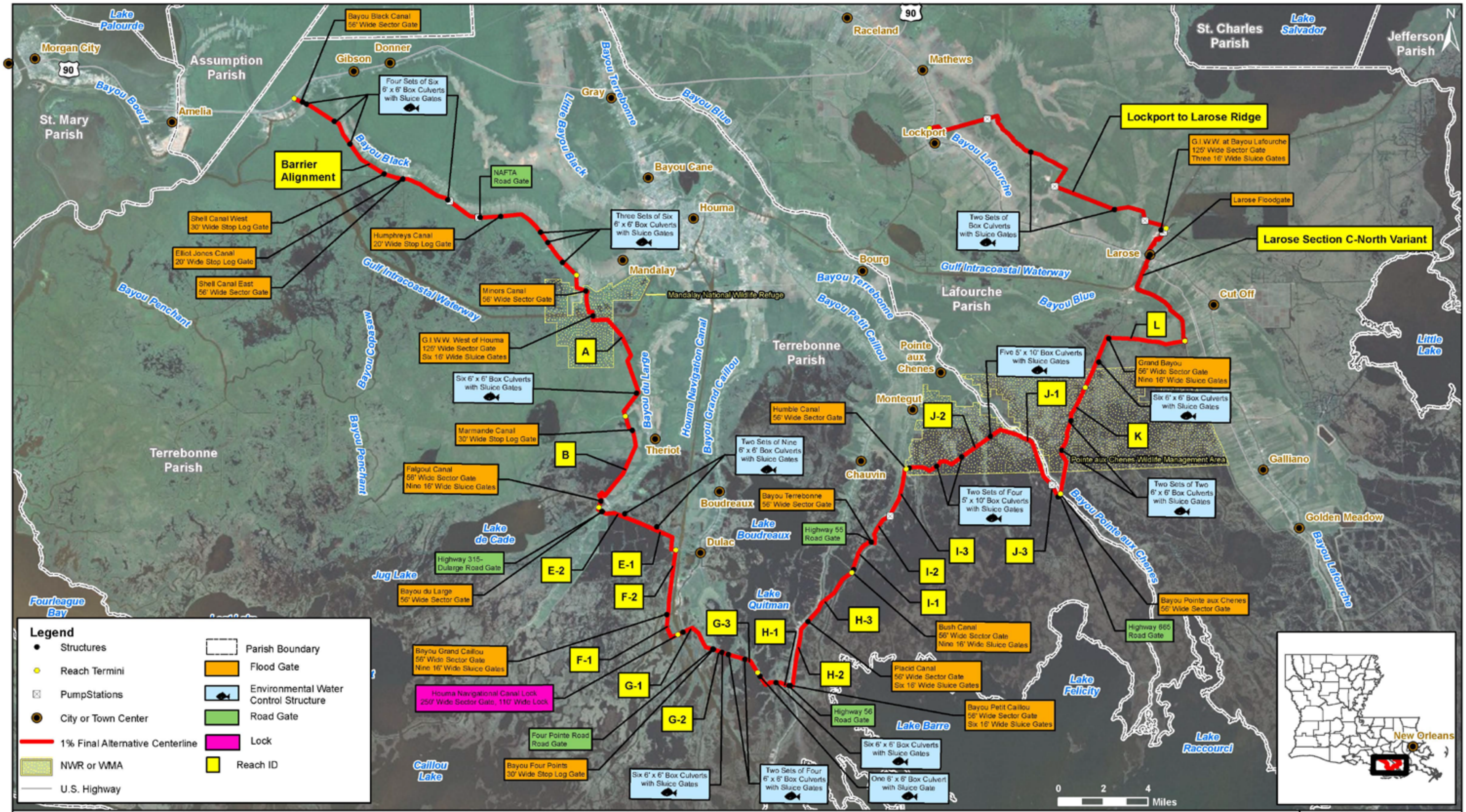

Figure 1. ALIGNMENT AND STRUCTURES OF THE 1% ANNUAL EXCEEDANCE PROBABILITY STORM SURGE RISK REDUCTION SYSTEM ALTERNATIVE

Morganza to the Gulf of Mexico, Louisiana
Revised Programmatic Environmental Impact Statement

Image: I3 USA Prime Imagery

GEC
Gulf Engineers & Consultants

Figure: 1
Date: June 2012
Scale: 1:256,000
Source: USACE/GEC
Map ID: 273160010-2811

Appendix J

ENVIRONMENTAL JUSTICE REPORT

Morganza to the Gulf PEIS: Environmental Justice Appendix

An environmental justice analysis was conducted which focused on the potential for disproportionately high and adverse impacts to minority and low-income populations during the construction and normal operation of the proposed risk-reduction system. While the assessment identified the occurrence of minority and low-income populations within the project area, both inside and outside of the proposed system, no disproportionately high and adverse effects to environmental or human resources are evident with any of the alternatives. Overall, at the tract level, the assessment found comparable impacts for communities outside the system regardless of socioeconomic status or race/ethnicity.

A disproportionately high and adverse effect means the impact is appreciably more severe or greater in magnitude on minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income populations after taking offsetting benefits into account.

The initial EJ analysis specifically included consideration of environmental justice concerns to include an assessment of the potential for disproportionately high and adverse effects to minority and/or low-income populations, as further described in Section 6.14.8 of the PEIS. Project impacts among minority and/or low-income populations were compared at the tract level to the impacts on the overall population within the project area using United States Census American Community Survey (ACS) data from 2005 and 2009. The impacts were found to be fairly distributed. Because the block group level data defines more EJ communities than the tract level data, the tract level data represents a more conservative evaluation of EJ communities and is useful in the analysis of EJ impacts in order to provide a consistent evaluation.

This appendix will provide additional information on EJ analysis methodology at the PEIS level. In future supplemental NEPA documents more details would be provided on EJ analysis including:

- Outreach and public involvement details
- Details of socioeconomic analysis for potential EJ impacts (demographics from the 2010 US Census at the census block level for race/ethnicity, and the 2007 – 2011 US Census American Community Survey at the census tract level for income/poverty) of residents both inside and outside of the levee system
- More details of buyout and buyout alternatives
    - Uniformed relocation assistance for communities to preserve cultures/languages/traditions

Methodology

For purposes of this analysis, EJ communities were identified when the percentage of minorities in a census block either exceeded 50 percent or was meaningfully greater than in the general population, and/or when low-income population percentage of census tracts was 20% or greater. Low-income populations of 20% or greater were considered a “poverty area” and populations of 40% or greater were defined as an “extreme poverty area”. Initially, the aggregate analysis used for EJ was at the census tract level. However, to provide a meaningful comparison, the analysis was refined at the recommendation of the US Environmental Protection Agency, Region 6 to include data at the census tract for income/poverty and census block level for race/ethnicity. Personal communication with Sharon Osowski, EPA Region 6, on March 1, 2013 confirmed this approach and level of analysis.

Analysis of the 2010 U.S. Census and the 2007 - 2011 ACS data indicates that 73 census blocks are located within 0.25 miles of the proposed 98-mile alignment ROW and residents could be affected by dust, noise and other construction-related activities. Approximately 32% of the residents living in the 73 census blocks are minority. Approximately 28% of the residents of the reference study areas of Lafourche and Terrebonne Parishes are minority. Residents of the census tracts around the proposed alignment, irrespective of income level, are expected to be similarly impacted by construction activities. Construction activities associated with the alignment are considered temporary in nature would not cause disproportionately high and adverse effects on any minority or low-income populations in accordance with the provisions of E.O. 12898.

Table 1. Induced Flood Area Community Data

Community Name	**Census Tract/Block**	**EJ Community**	**Percent Total Minority***	**Percent Households Below Poverty Level****
Gibson	16/2093, 2122	Yes	3%	21%
Bayou Du Large	14/1070, 1117, 1088	Yes	32%	42%
Dulac	13/1030, 1031, 1034	Yes	54%	31%
Cocodrie	12/1103, 1334, 1197, 1346-1350, 1232, 1329, 1330, 1076	No	15%	15%
Isle de Jean Charles	11/3061, 3064, 3080, 3084	Yes	90%	23%
*Source: US Census 2010 *Block Data, US Census ACS 2007 - 2011 **Tract Data*				

In the five communities (shown in Table 1) expected to experience induced flooding due to the proposed action, there are 24 census blocks. Of those 24 census blocks, 6 have a minority population of 50% or greater. The communities of Gibson and Bayou du Large consist of 5 block groups that could have induced flooding from the proposed alignment. None of those are predominately minority populations and they would not be identified as EJ communities. The communities of Dulac and Cocodrie have 15 census blocks and 2 of those are comprised of a minority population greater than 50%. Each of the 4 census blocks in the community of Isle de Jean Charles is comprised of a minority population greater than 50%. Two communities, Gibson and Dulac, meet the U.S. Census criteria for a poverty area while one, Bayou Du Large, meets the extreme poverty area designation.

The community of Dulac is bisected by the constructible features of the proposed alignment. The constructible feature cuts through one census block in Dulac which is comprised of a minority population of 56%. The constructible features would not result in induced flooding to the community of Dulac or other communities located outside of the proposed levee alignment. Residents of Dulac would be consulted at the time of Planning and Engineering Design (PED) to determine effective methods for minimizing construction related impacts and other potential impacts to the community.

An indirect impact of the construction of the project is the potential to raise water levels outside the levees by several feet during storm events causing induced flooding to several communities located outside of the proposed levee alignment. These areas include portions of the communities of Gibson, Bayou Dularge, Dulac, and all of Cocodrie and Isle de Jean Charles. As this is a Programmatic Environmental Impact Statement, additional analysis and outreach to identified EJ communities would be conducted during PED and documented in supplemental NEPA reports in order to minimize any potential disproportionate impacts, and develop appropriate mitigation strategies if necessary.

Mitigation for Adverse Impacts

A potential disproportionate impact may occur when the impact is appreciably more severe or greater in magnitude on minority or low-income populations than the adverse effect suffered by the non-minority or non-low-income populations after taking offsetting benefits into account. Regulations require that mitigation measures be developed to address environmental effects, including cumulative impacts, threatened by proposed actions (40 CFR 1502.14(f) and 1502.16(h)). In addition, mitigation measures should be developed specifically to address potential disproportionately high and adverse effects to minority and/or low-income communities. Potential mitigation measure for addressing adverse effects of construction of M2G could include:

- Providing assistance to the affected communities to ensure they receive a fair share of the anticipated benefits of the proposed action (infrastructure improvements)
- Providing uniform relocation assistance to the affected communities, with their concurrence

When identifying and developing potential mitigation measures to address environmental justice concerns, members of the affected communities would be consulted. Enhanced public participation efforts would also be conducted to ensure that effective mitigation measures are identified and that the effects of any potential mitigation measures are fully analyzed and compared. Mitigation measures may include a variety of approaches for addressing potential effects and balancing the needs and concerns of the affected community with the requirements of the action or activity. These details would be further identified and documented in supplemental NEPA documents to the RPEIS.

Appendix K

MITIGATION PLAN FOR CONSTRUCTIBLE ELEMENTS

APPENDIX K

MITIGATION PLAN FOR CONSTRUCTIBLE ELEMENTS

1. INTRODUCTION

A mitigation program (wetland mitigation plan) was developed by the USACE, in coordination with the Habitat Evaluation Team (HET), to compensate for both direct and indirect impacts to wetland habitats associated with the constructible elements of the proposed 1% AEP alternative (the 1% AEP project). These constructible elements (constructible components; constructible features) include project levee reaches F1, F2, and G1, the HNC Lock Complex, and the Bayou Grand Caillou Floodgate. This appendix provides detailed information concerning the proposed mitigation program.

All figures cited herein are provided at the end of this appendix. Section 10 contains definitions of certain terms used in this appendix. All elevations mentioned herein are expressed in feet NAVD88(2004.65).

2. MITIGATION OBJECTIVES

The primary objective of the proposed mitigation project is to restore approximately 394 acres of intermediate marsh habitat, 358 acres of brackish marsh habitat, and 883 acres of saline marsh habitat in order to fully compensate for direct and indirect impacts to fresh marsh, intermediate marsh, brackish marsh, and saline marsh habitats, as well as indirect impacts to open water habitats, that would result from building the constructible elements of the 1% AEP alternative. The proposed marsh restoration features are shown in Figures K1 through K4. More area then needed has been identified in the figures to allow for potential shift in the location due to unforeseen reasons such as pipelines.

Wetland Value Assessment (WVA) models (refer to Appendix F) were run for the cited impacts to determine the wetland functions and values that would be lost. Such functions/values are expressed in terms of Average Annual Habitat Units (AAHUs). As indicated in Table K-1 below, these models predicted that approximately 115.112 AAHUs would be lost due to direct and indirect impacts to existing fresh and intermediate marsh habitats combined, while approximately 534.07 AAHUs would be lost due to direct and indirect impacts to existing brackish and saline marsh habitats combined, over the course of the 50-year period of analysis.

Table K-1. Project wetland (habitat) impacts for constructible elements of the project.

Habitat	Direct Impacts		Indirect Impacts		Total Impacts	
	Acres	AAHUs	Acres*	AAHUs	Acres	AAHUs
Fresh Marsh	26	12.74	3,965	39.73	**3,991**	**52.47**
Intermediate Marsh	230	28.04	16,020	34.602	**16,250**	**62.64**
Total Fresh Marsh & Intermediate Marsh	***256***	***40.78***	***19,985***	***74.332***	***20,241***	***115.112***
Brackish Marsh	414	350.98	12,442	41.33	**12,856**	**392.31**
Saline Marsh	0	0	13,788	141.76	**13,788**	**141.76**
Total Brackish Marsh & Saline Marsh	***414***	***350.98***	***26,230***	***183.09***	***26,644***	***534.07***
GRAND TOTALS	**671**	**391.76**	**46,215**	**257.442**	**46,886**	**649.182**

Note: The AAHUs indicated are the net loss of AAHUs resulting from the project impacts, and thus should be viewed as negative values.
* The acres of indirect impacts to a particular marsh habitat type include the total acres of that type of marsh impacted, together with the total acres of open water habitats having the same salinity regime as the type of marsh impacted. For example, the table indicates 16,250 acres of intermediate marsh affected by indirect impacts. This acreage is not to intermediate marsh alone; instead it includes the acres of intermediate marsh impacted together with the acres of open water habitats having the same salinity range as intermediate marsh habitats.

CEMVN Regulatory Division considers fresh marsh and intermediate marsh habitats to essentially be equivalent habitat types. CEMVN Regulatory Division also considers brackish marsh and saline marsh habitats to essentially be equivalent habitat types. In accordance with these policies, mitigation for impacts to fresh marsh habitats can take the form of restoration of intermediate marsh habitats and vice versa to meet the requirement of “in-kind” mitigation. Similarly, mitigation for impacts to brackish marsh habitats can take the form of restoration of saline marsh habitats and vice versa. These policies have also been approved by the HET on a case by case basis.

The proposed mitigation plan was based on the policies mentioned above as regards achieving in-kind mitigation for project impacts. In other words, compensation for impacts to fresh marsh and intermediate marsh habitats is achieved through the restoration of intermediate marshes while compensation for impacts to brackish marsh and saline marsh habitats is achieved through restoration of both brackish marsh and saline marsh habitats.

WVA models on a generic site in the general project area were run to produce a mitigation potential number by habitat type (e.g. models predicted the average net gain in AAAHUs that would be produced by restoring the various marsh habitat types; mitigation potential = net gain in AAHUs/acre of marsh restoration). These model results were then used to determine the needed acres of mitigation. Individual WVA models will be run on the proposed mitigation features during the PED phase to verify that the proposed mitigation features can indeed produce the required AAHUs, and the proposed mitigation features will be adjusted as necessary to yield the required AAHUs.

Table K-2 lists each of the four intermediate marsh features proposed, the acreage of each feature, and the speculated net gain in AAHUs (e.g. net gain in wetland functions/values) that would be derived from each feature over the course of the 50-year period of analysis. Table K-3 provides similar data for each of the three brackish marsh features proposed and for each of the three saline marsh features proposed.

Table K-2. Proposed mitigation for fresh marsh and intermediate marsh impacts.

Mitigation Feature ID	Proposed Habitat	Acres	Net Gain AAHUs
IM2	Intermediate Marsh	293	84.68
IM4	Intermediate Marsh	134	38.73
Totals		**427**	**123.41**

Table K-3. Proposed mitigation for brackish marsh and saline marsh impacts.

Mitigation Feature ID	Proposed Habitat	Acres	Net Gain AAHUs
BM1	Brackish Marsh	129	58.05
BM2	Brackish Marsh	170	76.5
BM3	Brackish Marsh	59	26.55
Total Brackish Marsh		***358***	***161.10***

SM1	Saline Marsh	241	92.30
SM2	Saline Marsh	342	130.99
SM3	Saline Marsh	392	150.14
Total Saline Marsh		***975***	***373.43***
GRAND TOTALS		**1,333**	**534.53**

The use of these mitigation potentials indicate that the total net gain in AAHUs derived from the proposed intermediate marsh restoration features will be 123.41 AAHUs, while the total net loss of AAHUs resulting from impacts to both fresh marsh and intermediate marsh habitats combined would be 115.112 AAHUs. This demonstrates that the proposed intermediate marsh restoration should fully compensate for the fresh marsh and intermediate marsh functions/values lost due to the constructible project elements.

The this method indicate that the total net gain in AAHUs derived from the proposed brackish marsh and saline marsh restoration features combined will be 534.53 AAHUs, while the total net loss of AAHUs resulting from impacts to both brackish marsh and saline marsh habitats combined would be 534.07 AAHUs. This demonstrates that the proposed brackish and saline marsh restoration should fully compensate for the brackish marsh and saline marsh functions/values lost due to the constructible project elements.

One of the secondary objectives of the proposed mitigation project is to eradicate invasive and nuisance plant species within the mitigation features and to control re-infestation of the mitigation features by such plants. Invasive/nuisance plant species have the potential for jeopardizing the growth and development of native marsh species, thereby reducing typical functions and values associated with marsh habitats. The eradication and control of invasive/nuisance plant species will help ensure the restored marshes provide habitat and habitat functions/values typical of such marshes.

3. MITIGATION WORK PLAN

The proposed mitigation work plan consists of three primary components. These include the construction of the proposed marsh restoration features (refer to Figures K-1 through K-4), planting of the marsh restoration features, and eradication of invasive and nuisance plant species in the marsh restoration features.

3.1 CONSTRUCTION OF MARSH RESTORATION FEATURES

Earthen containment dikes (retention dikes) would first be constructed along the outer perimeter of each marsh feature to contain earthen materials (typically a slurry of sediments and water) placed within the marsh feature until these materials have consolidated and settled to desired final target grade elevation.

The earthen retention dikes would be built to an elevation that allows storage of both the borrow material and water needed to transport the material. In addition, the crest of the dikes would include a minimum one foot of freeboard to prevent overflow of effluent over the freshly constructed earthen dikes. Effluent discharge points (effluent returns, constructed as spill boxes or weirs) would be established at one or more locations along the course of the retention dikes at the time of construction to allow for effluent water release from within the mitigation feature. The freeboard of the dikes would act as a training dike to direct effluent waters over the effluent return locations. These locations would be determined during the PED phase. If practicable, the effluent returns would be positioned such that the effluent would flow into existing adjacent marsh habitats and thereby help nourish the adjacent marshes.

The earthen retention dikes would have a crown (top or crest) width of 5 feet and would have 1V:3H (Vertical:Horizontal) or 1V:4H side slopes depending on characteristics of the material used to construct the dikes. Borrow necessary to construct the retention dikes would be obtained from within the boundaries of the mitigation feature being established. The borrow ditch would be offset a minimum of 40 feet from the interior toe of the dike to ensure dike stability. If deemed necessary by the construction contractor, low level interior weirs could be constructed within a particular mitigation feature to assist in vertical stacking of the material used to establish the feature platform. During the PED phase, it may be determined that one or more retention (containment) dike segments may need to be constructed as armored earthen dikes or as rock dikes. The specific dimensions and characteristics of such dike segments would be specified in the PED phase.

Once construction of the containment dikes is completed, fill (borrow material) would be placed within the containment dikes to establish the marsh platform. Initial fill elevations (initial target grade elevations) within the features would be higher than the proposed final target grade elevations (desired final grades) due to expected dewatering and foundation settlement. Settlement curves based on onsite geotechnical data would be developed during the PED phase to finalize the amount of overbuild needed. Generally speaking, the initial target grade elevations would likely range from roughly 2 feet to 2.5 feet above the final target grade elevations.

The final target grade elevations desired within each proposed marsh feature would be determined during the PED phase. This determination would be based on bio-benchmark surveys of existing healthy marsh habitats in the general vicinity of the proposed marsh features. The protocol used in these surveys would be to determine the average elevation of at least 3 healthy marsh locations near each of the three groups of mitigation features (e.g. the intermediate marsh restoration feature group, the brackish marsh restoration feature group, and the saline marsh restoration feature group). The marsh surface elevation would be based on when the survey rod is resting among living stems or is supported by soil containing living roots. In order to get a consistent reading, it might be necessary to cut vegetation stems where stem density is extremely high. A minimum of approximately 20 elevations (each separated by roughly 20 to 40 feet) at each of the representative healthy marsh sites would be collected during the survey efforts.

Preliminary estimates of the desired final target elevations in the proposed marsh restoration features are as follows: Intermediate marsh features IM1 through IM4 = elevation 1.0; Brackish marsh features BM1 through BM3 = elevation 1.0 to 1.5; Saline marsh features SM1 through SM3 = elevation 1.5 or slightly higher. It is emphasized that these are preliminary estimates based on examination of existing LiDAR topography covering existing marshes near the proposed marsh features.

It is anticipated that it would take approximately 9 to 12 months to complete construction of the containment dikes and placement of fill in the marsh restoration features, although it could take longer depending on the availability of construction contractors. It is estimated that it would take an additional 9 to 12 months for the fill placed in the marsh restoration features to settle to the desired final target grade elevations. Once the fill has settled to the final target grade, the containment dikes would, to the extent practicable, be mechanically degraded such that the elevation of the degraded dike crest is the same as the elevation of the marsh feature. However, it may be necessary to create “gaps” in these dikes rather than completely degrading them. It is also possible that some dikes may be designed as armored earthen dikes or as rock dikes to help protect created marsh features. In such cases, leaving the dike crest elevation higher than the marsh platform elevation would be desirable and provision of dike gaps or “fish dips” in the dike would be necessary. General design criteria for dike gapping would include:

- If total dike degradation is not feasible, one 25-foot gap (bottom width) approximately every 500 linear feet of dike would be provided. The depth of a gap would be dependent upon whether the marsh is bordered by open water or existing marsh. Gaps adjacent to open water would have a depth equivalent to the pre-project water depth. Gaps adjacent to pre-existing marsh would have a depth equivalent to the average marsh elevation.
- If scour aprons are included, the bottom would be grubbed out so the gap depth is the pre-project elevation as measured to the top of the armoring.
- Degraded containment dike material would typically be placed either in remaining depressions within the marsh mitigation feature formed by excavation when building the dikes, or immediately adjacent to exterior side of the dike in open water areas. Degraded material would not be placed in pre-existing marshes.
- Field adjustments in the typical spacing and dimensions of gaps would be allowed based on conditions developing in the marsh restoration feature; however, such adjustments would only be made in coordination with NMFS and the rest of the HET and as approved by NMFS.

The proposed marsh restoration features could potentially block water exchange between adjacent existing marsh habitats and waterbodies, and could also reduce the ability of aquatic organisms to access these marsh habitats. To help reduce such effects, trenasses (tidal creeks, shallow flowways/channels) would be constructed through certain marsh restoration features.

These primary trenasses would be constructed in conjunction with the degrading of the retention dikes. The trenasses would have a bottom width of approximately 25 feet and a bottom elevation of approximately 1 foot deep in relation to the final target marsh grade. In addition to the primary trenasses, additional smaller trenasses would be constructed within proposed marsh features to serve as tidal creeks to facilitate water exchange and create shallow water interspersion features. In conjunction with the dike degrading efforts, these smaller trenasses would be rutted to a lower- than-marsh elevation by performing two passes of a marsh buggy along the desired alignment. The acceptable trenasse width, if constructed in this fashion, would be the width of the marsh buggy. If the resulting depression is not adequate for minimal water flow, the marsh equipment could excavate material along the proposed alignment, not to exceed a 5-foot bottom width by 1-foot to 1.5-feet deep channel. The locations, alignments, and dimensions of all trenasses would be determined during the PED phase.

Once the fill placed in the marsh restoration features has settled to the final target grade, each marsh feature would be planted with native marsh plant species as soon as feasible. Section 3.2 provides information concerning proposed marsh plantings.

One should also note that Figures K-1 through K-4 do not illustrate any additional potential borrow sites that may be needed to build the marsh restoration features. The USACE proposes to use organic overburden acquired within the levee borrow right-of-way (limited to the right-of-way encompassing the constructible project elements), the lock complex foot print, and the bypass channel as some of the fill needed to establish the marsh platforms. However, it is unknown if this overburden will be insufficient to completely build all the marsh features. Additional borrow material would be obtained from other areas; most likely from dredging existing open water areas. Such borrow areas (borrow sites) would be located to avoid and minimize wetland and shoreline impacts to the extent practicable, as would be other areas needed for mitigation construction such as access corridors and staging areas. Any unavoidable wetland impacts would be fully compensated as part of the proposed mitigation plan.

Borrow sites in open water areas would be excavated via hydraulic dredging, typically using a cutter-head dredge. The maximum depth of dredging would typically be limited to 15 to 20 feet below the existing water bottom. If portions of the existing Houma Navigation Canal are dredged for borrow, the depth of dredging would be limited to the depth previously authorized for maintenance dredging. Borrow acquired via dredging would typically be transported to the proposed marsh features via hydraulic pump and pipelines that would carry the slurry to the features. In certain cases, the dredged material would be transported to marsh features via barge and mechanically placed in the marsh feature.

The pipelines used to carry material from the borrow sites to the marsh restoration features could be routed: as submerged pipelines (laid along existing water bottoms; trenching used where needed to not impede navigation or recreational uses); as pontoon lines (pipelines suspended near surface of water by pontoons, with safety marker signs installed every 150 linear feet of pipeline); by running pipelines along existing shoreline/canal bank; using a combination of these approaches.

Flotation access corridors (channels) would be excavated as needed in shallow open water areas to allow construction equipment to access the mitigation features and borrow sites. If necessary, flotation access channels would be excavated by a mechanical dredge to maximum dimensions of approximately 80 feet wide and 10 feet deep. Flotation access channel material would be used in dike/closure construction or refurbishment, to backfill flotation access channels, or be placed adjacent to and behind the containment dikes and closures in shallow open water to an elevation conducive to wetlands development following consolidation of the material. Flotation access channel material used to backfill the flotation access channels following completion of disposal work would be temporarily stockpiled on water bottoms adjacent to the flotation access channels.

Access corridors to marsh restoration features and borrow sites would be a maximum of about 200 feet wide and would cross over uplands, wetlands, and shallow open water as necessary. Access corridors also may be placed across or along the crown of existing levees in the project vicinity. If existing canals are used for access, they may be dredged to facilitate the flotation of pipelines and the transport of other necessary equipment to material discharge sites. Material removed from existing canals would be placed on adjacent levees and/or into shallow open water on either side of canals. Canal dredged material placed in shallow open water areas would be placed at a height conducive for wetlands development.

If construction equipment and discharge pipelines are placed across or along the crown of existing levees in the project vicinity, the levees may be refurbished using borrow material from adjacent shallow open water to facilitate their use as access corridors for construction equipment and discharge pipelines. Access corridors crossing existing levees would be no wider than about 100 feet.

Existing levees near the proposed marsh features may be degraded as necessary to provide mitigation construction access. Levees degraded for construction access may be rebuilt following completion of disposal activities. Degraded levee material would be placed/stockpiled in shallow open water adjacent to the degraded levee sections or on adjacent levees. Material degraded from levees may be used to rebuild degraded levee sections. Borrow material required to rebuild degraded levee sections would be excavated from adjacent shallow water. If levees are not to be rebuilt using material removed during levee degradation activities, any levee material that was placed in shallow open water would be degraded, if necessary, to a height conducive to wetlands development.

The construction or designation of staging areas may be necessary for mitigation construction equipment and for the unloading of pipeline and other equipment necessary to perform disposal operations. Staging areas would have a maximum area of about 300 feet by 300 feet. If necessary, materials such as gravel, sand, dirt, shell, or some combination of earthen materials would be permanently placed over existing upland, wetland, and shallow open water habitat to construct staging areas.

Temporary board roads may be constructed along access corridor alignments and staging areas wherever emergent marsh exists. Board roads would be removed when work is completed. Fill material may be deposited where the board road would be located to offset damage to the underlying marsh caused by soil compression. Board road fill material may be degraded to adjacent marsh elevations following completion of disposal activities either by placing excess material into nearby shallow open water to elevations conducive to wetlands development, by placing material on existing uplands/levees, or by removing material from the project vicinity.

Details of borrow sites, construction access corridors, flotation access corridors, levee access corridors, and construction staging areas will be developed during the PED phase. Every effort would be made to design these work plan components so as to avoid and minimize environmental impacts to the extent practicable. Any unavoidable impacts to wetland habitats would be mitigated through the expansion of one or more of the proposed marsh restoration features, depending on the type of habitat affected.

The USACE will be responsible for conducting all the mitigation construction activities, although the costs associated with these activities will be cost-shared with the NFS.

The construction activities listed in this section would be implemented concurrent with the construction of the constructible project elements (constructible elements of the 1% AEP alternative). To the extent practicable, the initial mitigation construction activities would be completed within 18 months of the start of mitigation construction. These initial mitigation construction activities would include construction of the containment/retention dikes and the initial placement of all fill (borrow) material necessary to establish the marsh restoration features. The initial construction activities (initial construction phase) would not include the time period necessary for the borrow material to settle to the final target marsh platform elevation and would not include subsequent construction activities, such as degrading or gapping the containment dikes, or completion of initial plantings.

Risk and Uncertainty

At this stage, some aspects of the proposed mitigation plan have not been determined. For example, the locations and limits of additional borrow sites, if needed, to obtain fill to construct the proposed mitigation features are unknown as are other mitigation construction components such as construction access corridors and staging areas.

Given uncertainties such as those above, several aspects of the mitigation program discussed herein could be refined and modified during the Preconstruction Engineering & Design (PED) phase of the project. USACE will coordinate closely with the HET, the Non-Federal Sponsor (NFS), and other members of the Project Delivery Team (PDT) during the PED phase in making any refinements and modifications to the mitigation program. It is possible that further investigations and analyses conducted during this phase could reveal potential environmental impacts not previously considered or could mandate substantial changes to the mitigation plan. Under such circumstances, it may be determined that a supplemental NEPA document addressing the mitigation plan is warranted. This supplemental NEPA document would be prepared by USACE if necessary, in coordination with the HET, NFS, and PDT.

3.2 INITIAL PLANTING OF MITIGATION FEATURES

Herbaceous species will be planted on 7-foot centers (average) to achieve a minimum density of 889 plants per acre. Stock will typically be either 4-inch container size or bare-root or liner stock, depending on the species involved. Plants will be obtained from a registered licensed regional nursery/grower and of a regional eco-type species properly stored and handled to ensure viability. The plants will typically be installed during the period from March 15 through June 15. Planting should not be undertaken later than approximately July 15, although planting during the early fall may be deemed acceptable on a case-by-case basis if necessary. The plants will be installed in a manner that avoids monotypic rows of the same species (goal is to have spatial diversity and mixture of planted species).

It may be determined that the initial planting of brackish and/or saline marsh features would best be conducted in phases. Using this approach, a certain percentage of the total number of plants required would be installed in the year that final marsh construction activities are completed while the remainder would be installed in the following year. The determination of whether to use phased planting or to install all the necessary plants upon completion of construction activities will be made during the PED phase.

Species installed in proposed intermediate marsh habitats will be selected from the species list provided in Table K-4. Plantings will consist of at least 2 different species. Species installed in proposed brackish marsh habitats will be selected from the species list provided in Table K-5. Plantings will consist of at least 2 different species. Species installed in proposed saline marsh habitats will be selected from the species list provided in Table K-6. Plantings will consist of at least 2 different species. The species used and the proportion of the total plantings represented by each species will be determined during the PED phase. Various factors such as site conditions and planting stock availability could alter the plant species proposed by the time a contract is awarded for these plantings. Any deviations from the final planting lists determined in the PED phase would have to first be approved by the USACE in coordination with the HET and NFS.

Table K-4: Preliminary Planting List for Intermediate Marsh Habitats

Common Name	Scientific Name
California bulrush	*Schoenoplectus californicus*
Black needle rush	*Juncus roemerianus*
Giant cutgrass	*Zizaniopsis miliacea*
Marsh-hay cordgrass	*Spartina patens*
Maidencane	*Panicum hemitomon*
Common threesquare	*Shoenoplectus americanus*
Big cordgrass	*Spartina cynosuroides*
Seashore paspalum	*Paspalum vaginatum*

Table K-5: Preliminary Planting List for Brackish Marsh Habitats

Common Name	Scientific Name

Marsh-hay cordgrass	*Spartina patens*
Black needle rush	*Juncus roemerianus*
Smooth cordgrass	*Spartina alterniflora* var. *Vermilion*
Saltmarsh bulrush	*Schoenoplectus robustus*
Common threesquare	*Shoenoplectus americanus*
Salt grass	*Distchilis spicata*

Table K-6: Preliminary Planting List for Saline Marsh Habitats

Common Name	Scientific Name
Smooth cordgrass	*Spartina alterniflora* var. *Vermilion*
Salt grass	*Distchilis spicata*
Marsh-hay cordgrass	*Spartina patens*
Gulf cordgrass	*Spartina spartinae*
Saltwort	*Batis maritima*

Also during the PED phase, it may be determined that planting of black mangroves ((*Avicennia germinans*) in certain portions of the proposed saline marsh restoration features is desirable. Such plantings would be limited to relatively narrow bands/swaths in the marshes along or near the marsh “shorelines” (e.g. perimeter marsh areas bordering open water areas). Typically such plantings would use 1-gallon stock installed on 7-foot centers, but this generalization could be revised during the PED phase if black mangroves are indeed added to the planting list for certain saline marsh areas.

The initial planting of the mitigation features will be the responsibility of the USACE. Costs associated with this initial planting will be cost-shared with the NFS.

One should note that it was assumed that one re-planting event would be necessary to meet native vegetation success criterion 3.B (refer to Section 7). It was assumed that roughly 50% of the total number of plants initially installed would have to be re-planted to meet this criterion. This re-planting event, which is considered a maintenance action, would be the responsibility of the USACE although the costs associated with this re-planting would be cost-shared with the NFS. Keep in mind, however, this particular re-planting event would be performed if the cited success criterion is satisfied.

3.3 ERADICATION OF INVASIVE AND NUSIANCE PLANT SPECIES

Shortly before starting the initial plantings discussed in Section 3.2, invasive and nuisance plant species would be eradicated throughout each of the marsh restoration features. Such plants would be eradicated using ground-based applications of appropriate herbicides as discussed in Section 4. Invasive and nuisance plant eradication events (follow-up events) would take place at various intervals following completion of the initial installation of native plants in each marsh restoration feature as warranted. A preliminary schedule for these “follow-up” events will be developed in the PED phase. However, this schedule could be altered based on the results of mitigation monitoring activities.

The USACE will be responsible for conducting the invasive and nuisance plant eradication events until such time that the following mitigation success criteria are achieved (refer to Section 7): General construction criteria 1.A and 1.B; Topography criteria 2.A and 2.B; Native vegetation criteria 3.A and 3.B; Invasive & nuisance vegetation criterion 4.A. Costs associated with these events (e.g. those that are the responsibility of USACE) will be cost-shared with the NFS.

4. MAINTENANCE AND MANAGEMENT PLAN

One of the maintenance and management activities anticipated involves the short-term and long-term eradication and control of invasive and nuisance plant species. It is anticipated that there will be 1 invasive/nuisance plant eradication event during the year final mitigation construction activities are completed, 2 such events during the year the mitigation features are first planted, and at least 2 such events during each of the three years following the year of initial planting. It is anticipated that there will be at least 1 invasive/nuisance plant eradication event per year in the fourth and fifth year following the year of initial planting. Thereafter, it is anticipated that there will be one invasive/nuisance plant eradication event every three to five years.

One should note that the actual frequency of invasive/nuisance plant eradication events may differ from the frequency discussed above. The frequency and intensity of these events will largely be determined based on the degree of invasive/nuisance plant infestation observed during mitigation monitoring activities, as well as that observed during periodic inspections of the mitigation features conducted outside the framework of prescribed mitigation monitoring events.

The methods used to eradicate invasive and nuisance plant species may vary. Invasive/nuisance plants will likely be eradicated using ground-based applications of appropriate herbicides to the target plants. The specific equipment (e.g. backpack sprayers, wick applicators, hand application, etc.) used to apply the herbicides will be determined by the contractor to maximize effectiveness. Regardless of the methods involved, care will be exercised to avoid damage to desirable native species to the greatest extent practicable. Ground-based herbicide applications will typically occur during the early part of the growing season in cases where there will be 1 or 2 application events during a given year, and will typically occur again during the latter part of the growing season in cases where there will be 2 application events during a given year.

The USACE will be responsible for performing invasive/nuisance plant eradication events until mitigation success criteria 1.A, 1.B, 2.A, 3.A, 3.B, and 4.A and are all satisfied (refer to Section 7). During this period of responsibility, the USACE will also be responsible for ensuring mitigation success criterion 4.B. is satisfied (refer to Section 7). The cost of performing the activities conducted as the responsibility of the USACE will be cost-shared with the NFS. The NFS will be responsible for performing invasive/nuisance plant eradication events once the cited success criteria are satisfied. The costs for performing these events will be borne solely by the NFS.

As mentioned in Section 4, maintenance/management activities will include one re-planting event conducted after the initial planting of native canopy and midstory species. It was assumed that this event, involving the re-planting of approximately 50% of the total number of plants first installed, would be necessary to satisfy native vegetation success criterion 3.B (see Section 7). However if the referenced success criterion is satisfied, this re-planting event will not be performed. It is not anticipated that subsequent re-plantings will be necessary, with the potential exception of re-planting required for adaptive management (see Section 5). Should additional re-plantings be necessary to satisfy applicable mitigation success criteria, then these re-plantings would become part of the management/maintenance activities.

The USACE will be responsible for performing the single re-planting event discussed above, including provision of the necessary plants, and the cost of this re-planting will be cost-shared with the NFS. The NFS will be responsible for any subsequent re-plantings required to meet applicable mitigation success criteria and the cost for such re-plantings will be borne solely by the NFS, with the exception of re-plantings covered under the Adaptive Management Plan. Re-plantings covered under this plan would be cost-shared with the NFS.

As previously discussed, certain containment dikes along the perimeter of one or more marsh features may be built as armored earthen dikes or as rock dikes. Should this be the case, maintenance activities would likely include periodic repair and/or rehabilitation of such dike segments, including dike gaps and fish-dips, to ensure their integrity and help prevent erosion/loss of adjacent restored marsh habitats. It is assumed that at least one maintenance event would be necessary during the period of mitigation monitoring. However, additional maintenance events may be necessary to help ensure applicable mitigation success criteria are achieved. The NFS would be responsible for conducting all maintenance activities and the cost of the single maintenance event anticipated would be borne solely by the NFS. Any dike maintenance activities conducted pursuant to the Adaptive Management Plan would be cost-shared with the NFS.

5. ADAPTIVE MANAGEMENT PLAN

Adaptive Management (AM) activities during the life-cycle of the mitigation project will address ecological and other uncertainties that could prevent successful implementation of the mitigation features as described within this appendix. AM also establishes a framework for decision making that utilizes monitoring results and other information, as it becomes available, to update project knowledge and adjust management/mitigation actions. Hence, early implementation of AM and monitoring allows for a project that can succeed under a wide range of conditions and can be adjusted as necessary. Furthermore, careful monitoring of project outcomes both advances scientific understanding and helps adjust the project as part of an iterative learning process. This AM plan allows for taking corrective actions in cases where monitoring demonstrates that mitigation measures are not achieving ecological success.

WRDA 2007, Section 2036(a) requires an AM plan for all mitigation plans and specifies:

- an AM plan will be developed for all mitigation plans.
- the AM plan must be appropriately scoped to project scale;
- if the need for a specified adjustment is anticipated due to high uncertainty the nature and costs for actions should be explicitly described as part of the decision document;
- the information provided by the monitoring plan will be used by the District Engineer and Division Commander to guide decisions on operational and or structural changes that may be needed to insure the mitigation measures meet success criteria;
- identified physical modifications will be cost-shared and must be agreed upon by the local non-Federal sponsor;
- adaptive management plan costs should be shown in 06 feature code of the cost estimate;
- changes to the AM plan approved in the decision document must be coordinated with USACE Headquarters; and
- significant changes needed to achieve ecological success that cannot be addressed through operational changes or are not included in the approved AM plan may be examined under other authorities.

Independent of AM, an effective monitoring program is required to determine if the mitigation project outcomes are consistent with performance standards. Mitigation success criteria were developed as the basis of determining ecological success and to determine if adaptive management actions are required. Upon completion of the mitigation project, monitoring for ecological success will be initiated and will continue until ecological success is achieved, as defined by the mitigation success criteria. The following objectives: performance measures, and adaptive management triggers would be further refined during the PED phase.

Objective 1: Mitigate for project-induced impacts by creating 2,842 acres of intermediate, brackish and saline marsh.
Performance Measure: Marsh elevation (topography).
Threshold/Trigger: If the marsh elevations described in the success criteria/desired outcomes are not maintained, supplemental topographic alterations through adaptive management may be necessary. Additional thresholds/triggers will be developed during PED.

Performance Measure 2: Species composition and percent cover for vegetation plantings.
Threshold/Trigger: If the identified success criteria are not met there may be a need for an adaptive management actions including replanting of areas that no longer meet success criteria and/or replanting of areas that required topographic alterations. Additional thresholds/triggers will be developed during PED.

Objective 3: Control of invasive and nuisance plant species.
Desired Outcome: Maintain all marsh restoration features such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event. The total average vegetative cover accounted for by invasive and nuisance plant species are each less than 5% of the total plant cover in each marsh feature throughout the duration of the monitoring period.

> **Threshold/Trigger:** No adaptive management is expected to be needed as maintenance of invasive species is part of the O&M for the project. If a large amount of invasive species are removed through O&M efforts, potential AM actions include replanting of the areas previously covered by invasive species. Additional thresholds/triggers will be developed during PED.

The USACE and the NFS will be responsible for any adaptive management determined to be needed to attain the identified success criteria until such time as ecological success is determined and a notice of construction completion (NCC) is provided to the non-Federal sponsor for the mitigation project. In the event the monitoring reports submitted to CEMVN reveal that any success criteria have not been met after the project is turned over and in the OMRR&R phase, the NFS, or its assigns after consultation with CEMVN and other appropriate agencies, will take all necessary measures to modify management practices in order to achieve these criteria in the future.

To better ensure successful performance of the implementation of identified mitigation features the following future scenarios for mitigation features were considered based on critical uncertainties (e.g., salinities, wetland hydrology, inundation, increased subsidence, reduced accretion, tidal amplitude, and Relative Sea Level Rise, etc. The most likely AM action involves wetland renourishment of areas (add additional sediment) or replanting should project monitoring reports indicate success criteria are not being achieved and adjustment of mitigation feature(s) is needed. The following best case, worst case and most likely scenarios are not AM triggers; rather, they were developed to estimate overall AM costs for mitigation projects based upon the potential resiliency of the constructed mitigation projects to the above described uncertainties related to marsh degradation or loss:

- Best Case – Assume 3% loss of 1,760 acres or 53 acres. Replace 53 acres at $30,000/acre for $1,590,000
- Worst Case – assume 12% loss of 1,760 acres or 211 acres. Replace 211 acres at $30,000/acre for $6,330,000
- Most Likely – Assume approximately 6% loss of 1,760 acres or 106 acres. Replace 106 acres at $30,000/acre for $3,180,000

Based upon the above comparison, the most likely scenario (i.e. a total of $3,180,000) would be allocated for AM actions including potential wetland creation, restoration and renourishment actions over the cost-shared portion of the mitigation projects. Additional costs for AM include data management ($364,000) and AM Program Planning and Management ($250,000) for a total Adaptive Management cost of $3,794,000.

It should be noted that many factors such as ecosystem dynamics, engineering design, institutional requirements, and many other key uncertainties can change and/or evolve over a project's life. The adaptive management and monitoring elements will be updated to reflect monitoring-acquired and other new information, as well as enabling continued resolution of and progress on resolving existing key uncertainties or identification of any new uncertainties that might emerge. The AM plan will be used during and after project construction to adjust the mitigation project, as necessary, to better achieve mitigation success criteria outputs/results.

6. LAND ACQUISITION & PRESERVATION/PROTECTION OF MITIGATION FEATURES

Various lands must be acquired for the proposed mitigation features themselves, for areas required for mitigation construction access, for areas required for borrow sites, and for future mitigation maintenance/management access. Such lands (properties) will be acquired by the Non-Federal Sponsor. Presently the exact locations and types of lands to be acquired have not been identified for all the lands needed. This will be determined during the PED phase.

Properties required could be privately owned or owned by a governmental agency. For areas that are owned by a governmental agency, the Non-Federal Sponsor will sign an inter-agency agreement that will allow the USACE to construct the 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 his/her property. The owner will be given an opportunity to negotiate the sale price of the property. If the Non-Federal Sponsor and the owner are not able to come to an amicable agreement as to price or if the title of the property is not clear, the acquisition will be completed through the expropriation process.

In order to accomplish the integrity of the mitigation project, the Non-Federal sponsor will acquire fee excluding minerals over the identified marsh restoration features. This estate allows the owner to retain the mineral rights, but prohibits the use of the surface for exploration or development of the minerals. Depending on the size of the ownership and the size of 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 proposed marsh restoration features are identified and ownership search is conducted, this cannot be determined.

Access routes to the marsh restoration features as well as areas for equipment/contractor staging will be acquired by the Non-Federal Sponsor 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 of time. These areas would also be appraised and the owner would negotiate with the Non-Federal sponsor the sale price of these temporary acquisitions.

All real estate acquisitions will be accomplished in the name of the Non-Federal Sponsor. The Sponsor in turn will grant the USACE right of entry to accomplish the work. The marsh restoration features will remain in the ownership of the Sponsor who will be responsible for OMRR&R. Ownership of the sites acquired for temporary use will revert to the landowner upon expiration of the easement.

The Non-Federal Sponsor will be required to preserve and protect the marsh restoration features in perpetuity. This requirement will be assured via the existing Project Partnership Agreement (PPA) between the USACE and the Non-Federal Sponsor, as well as through appropriate language in the Operation and Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) manual that will be prepared for this project by CEMVN and provided to the Non-Federal Sponsor.

7. MITIGATION SUCCESS CRITERIA

The ecological success (performance) criteria applicable to the proposed mitigation are described in the sub-sections that follow. The year numbers cited are based on the initiation of mitigation construction activities beginning in year 1.

1. General Construction

A. Within approximately 9 to 12 months following the start of mitigation construction, complete all initial mitigation construction activities (e.g. construction of perimeter retention/containment dikes, placement of fill (borrow material/dredged material) into mitigation feature, construction of perimeter rock dikes and/or armoring of perimeter containment dikes if applicable, etc.).

B. Approximately 1 year following completion of all initial mitigation construction activities (when the restored marsh feature has attained the desired final target soil surface elevation) complete all final mitigation construction activities. Such activities could include, but are not limited to: degrading perimeter containment dikes such that the areas occupied by these dikes have a surface elevation equivalent to the desired final target marsh elevation; completion of armoring, if required, of any containment dikes; “gapping” of perimeter containment dikes and/or installation of “fish dips” in perimeter containment dikes, if necessary; and construction of trenasses or similar features within marsh features as a means of establishing shallow water interspersion areas within the marsh. Finishing the aforementioned construction components will be considered as the “completion of final mitigation construction activities”. As noted, this is anticipated to occur approximately 1 year after placement of fill material in the mitigation feature is completed.

2. Topography

A. Upon completion of final mitigation construction activities (near end of Year 2) –

- Demonstrate that at least 80% of each mitigation feature has a surface elevation that is within 0.5 feet of the desired final target surface elevation.

B. 1 year following completion of final mitigation construction activities (Year 3) –

- Demonstrate that at least 80% of the mitigation site has a surface elevation that is within 0.5 feet of the desired final target surface elevation.

C. 3 years following completion of final mitigation construction activities (Year 5) –

- Demonstrate that at least 90% of the mitigation site has a surface elevation that is within the functional marsh elevation range.

Notes: The desired final target elevation for each marsh feature would be determined during the final PED phase. The "functional marsh elevation range", e.g. the range of the marsh surface elevation that is considered adequate to achieve proper marsh functions and values, would also be determined during the PED phase. These determinations will apply to the topographic success criteria above and could potentially alter the marsh area percentages set forth in these criteria.

3. Native Vegetation

A. Complete initial plantings in each marsh feature in accordance with the applicable marsh planting specifications (early in Year 3).

B. 1 year following completion of initial plantings (Year 4) –

- Within each marsh feature, attain at least 80% survival of planted species, or; Achieve a minimum average cover of 50%, comprised of native herbaceous species (includes planted species and volunteer species). As regards survival of planted species, the surviving plants must approximate the species composition and the species percentages specified in the initial plantings component of the Mitigation Work Plan. These criteria will apply to the initial plantings as well as any subsequent replantings necessary to achieve this initial success requirement. Note that if black mangroves were installed in a particular mitigation feature, then survival of at least 80% of the installed mangroves is also required in addition to the typical success criteria indicated above.
- Demonstrate that vegetation satisfies USACE hydrophytic vegetation criteria. This criterion will thereafter remain in effect for the duration of the overall monitoring period.

C. 3 years following completion of initial plantings (Year 6) –

- Within each marsh feature, achieve a minimum average cover of 75%, comprised of native herbaceous species (includes planted species and volunteer species). Note that if black mangroves were initially planted in a particular mitigation feature, then survival of at least 50% of the installed mangroves is also required in addition to this typical vegetative cover success criterion.

D. For the period beginning 4 years following completion of initial plantings and continuing through 20 years following completion of initial plantings (Years 7 through 27) –

- Within each marsh feature, maintain a minimum average cover of 80%, comprised of native herbaceous species.

4. Invasive and Nuisance Vegetation

A. Complete the initial eradication of invasive and nuisance plant species within 1 year of completion of final mitigation construction activities.

B. Maintain all marsh features such that they are essentially free from invasive and nuisance plant species immediately following a given maintenance event and such that the total average vegetative cover accounted for by invasive and by nuisance species each constitutes less than 5% of the total average plant cover in each marsh feature during periods between maintenance events. These criteria must be satisfied throughout the duration of the overall monitoring period.

8. MITIGATION MONITORING AND REPORTING

8.1 STANDARD MITIGATION MONITORING AND MITIGATION MONITORING REPORTS

8.1.1 "Time Zero" Monitoring Report (Monitoring Report #1)

Shortly after completion of the final mitigation construction activities the mitigation features will be monitored and a "time zero" or "baseline" monitoring report prepared. Information provided will include the following items:

- A discussion of all mitigation activities completed.
- A description of the various mitigation features (the marsh restoration features).
- Plan view drawings of the mitigation features showing their approximate boundaries as well as significant interspersion features established within the marshes (as applicable), and the locations of permanent photo stations and staff gages installed.
- An as-built survey of finished grades in the mitigation features (topographic survey), along with an assessment of whether the applicable topography success criterion (criterion 2.A) has been satisfied and an assessment of whether the general construction success criteria (criteria 1.A and 1.B) have been satisfied. This survey will also contain survey information for any "gaps" or "fish dips" established in the perimeter containment dikes, as well as survey information for any rock dikes or armored earthen dikes. The as-built survey will be conducted using LiDAR supplemented by conventional ground-survey methods. Note that this 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 this evaluation indicates success has not been achieved, then supplemental topographic alterations would be performed by the USACE, a second as-built topographic survey of the affected areas would be conducted following 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.
- Photographs documenting conditions in each restored marsh feature at the time of monitoring. Photos will be taken at permanent photo stations within the marsh features. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next. The number of photo stations required as well as the locations of these stations will vary depending on the mitigation feature. The USACE will make this determination in coordination with the HET and NFS during the PED phase. At a minimum, there will be at least 4 photo stations established within each marsh feature.
- Water level elevation readings collected at the time of monitoring from staff gages installed within some of the restored marsh features. The number of staff gages and their locations will be determined by the USACE in coordination with the HET and NFS during the PED phase. The monitoring report will provide the staff gage data along with mean high and mean low water elevation data as gathered from a tidal elevation recording station in the general vicinity of the mitigation sites. The report will further address estimated mean high and mean low water elevations at the mitigation sites based on field indicators.
- Various qualitative observations will be made in the mitigation features to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimate of the average percent cover by native plant species; general estimates of the average percent cover by invasive and nuisance plant species; general observations concerning colonization of the mitigation features by volunteer native plant species; general condition of native vegetation; trends in the

composition of the plant community; wildlife utilization as observed during monitoring (including fish species and other aquatic organisms); the condition of interspersion features (tidal channels, trenasses, depressions, etc.) constructed within the marsh features, noting any excessive scouring and/or siltation occurring within such features; the natural formation of interspersion features within restored marshes; observations regarding general surface water flow characteristics within marsh interspersion features; the general condition of "gaps", "fish dips", or similar features constructed in containment dikes; if present, the general condition of any armoring installed on permanent dikes. General observations made during the course of monitoring will also address potential problem zones and other factors deemed pertinent to the success of the mitigation program.

- A summary assessment of all data and observations along with recommendations as to actions necessary 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.

8.1.2 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 sites showing the approximate boundaries of the different mitigation features (marsh restoration features), monitoring transect locations, sampling plot locations, photo station locations, and staff gage locations.

- A brief description of maintenance and/or management and/or mitigation work performed since the previous monitoring report along with a discussion of any other significant occurrences.

- Photographs documenting conditions in the mitigation site at the time of monitoring. Photos will be taken at permanent photo stations within the mitigation site. At least two photos will be taken at each station with the view of each photo always oriented in the same general direction from one monitoring event to the next.

- Quantitative data concerning plants in the ground cover stratum. Data will be collected from permanent sampling quadrats established at approximately equal intervals along permanent monitoring transects established within each marsh feature. Each sampling quadrat will be approximately 2 meters X 2 meters in size, although the dimensions of each quadrat may be increased if necessary to provide better data. The number of monitoring transects and number of sampling quadrats per transect will vary depending on the mitigation feature. This will be determined by the USACE in coordination with the HET and NFS during the PED phase. Data recorded from the sampling quadrats will include: average percent cover by native plant species; average percent cover by invasive plant species; average percent cover by nuisance plant species; composition of plant species and the wetland indicator status of each species. The average percent survival of planted species (i.e. number of living planted species as a percentage of total number of plants installed) will also be recorded. However, data for percent survival of planted species will only be recorded until such time as it is demonstrated that applicable success criteria for plant survivorship have been achieved.

- A summary of water level elevation data collected from the staff gages installed within the marsh restoration features as collected at the time of monitoring. Each monitoring report will also provide mean high and mean low water elevation data as gathered from a tidal elevation recording station in the general vicinity of the mitigation sites. The report will further address estimated mean high and mean low water elevations at the mitigation sites based on field indicators.

- Various qualitative observations will be made in the mitigation features to help assess the status and success of mitigation and maintenance activities. These observations will include: general estimate of the average percent cover by native plant species; general estimates of the average percent cover by invasive and nuisance plant species; general observations concerning colonization of the mitigation features by volunteer native plant species; general condition of native vegetation; trends in the composition of the plant community; wildlife utilization as observed during monitoring (including fish species and other aquatic organisms); the condition of interspersion features constructed within the marsh features, noting any excessive scouring and/or siltation occurring within such features; the natural formation of interspersion features within restored marshes; observations regarding general surface water flow characteristics within marsh interspersion features; the general condition of "gaps", "fish dips", or similar features constructed in containment dikes; if present, the general condition of any armoring installed on permanent dikes. General observations made during the course of monitoring will also address potential problem zones and other factors deemed pertinent to the success of the mitigation program.

- A summary assessment of all data and observations along with recommendations as to actions necessary 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.

- For monitoring report #2 only, a detailed inventory of all species planted in each mitigation feature, including the number of each species planted and the stock size planted.

- For any monitoring report conducted in a year when one or more marsh restoration features must be re-planted, a detailed inventory of all species installed in the applicable mitigation feature(s), including the number of each species planted and the stock size planted. A depiction of the areas re-planted will also be provided.

- For monitoring report #2 and monitoring report #5, a survey of surface grades in the mitigation features (topographic survey), along with an assessment of whether the applicable topography success criteria have been satisfied (e.g. success criterion 2.B for monitoring report #2, success criterion 2.C for monitoring report #5). These surveys will be conducted using LiDAR supplemented by conventional ground-survey methods. A given survey indicates topographic success criteria have not been achieved and supplemental topographic alterations are necessary, then another topographic survey may be required following completion of the supplemental alterations. This determination will be made by USACE in coordination with the HET and NFS.

8.2 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 the results of the consultations. To satisfy these requirements, annual consultation reports (District Consultation Reports) will be prepared and submitted to the USACE Mississippi Valley Division (MVD), or the reports will be submitted as directed by MVD. Each report will provide the following information:

- List of the types of mitigation implemented.
- Brief description of the mitigation, including acres implemented and acres remaining to be implemented (if any).
- Description of the consultation process (steps taken to consult with other Federal agencies and State agencies).
- Discussion of the status of consultation, identifying the agencies involved and the outcome. If consultation is complete, a listing of 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.
- Discussion of the outcome of consultation (if completed). This discussion will 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.

In addition to the District Consultation Reports discussed above, data and information concerning the mitigation will be entered into the USACE's Civil Works Project Mitigation Database on an annual basis. The data and information required for entry into this database are specified within the database itself (website URL: https://sam-db01mob.sam.ds.usace.army.mil:4443/pls/apex/f?p=107).

8.3 MITIGATION MONITORING & REPORTING SCHEDULE AND RESPONSIBILITIES: STANDARD MONITORING AND REPORTING

Monitoring will typically take place in late summer of the year of monitoring, but may be delayed until later in the growing season due to site conditions or other unforeseen circumstances. Monitoring reports will be submitted by November 30 of each year of monitoring. Monitoring reports will be provided to the USACE, the NFS, and the agencies comprising the HET.

The USACE will be responsible for conducting the monitoring events and preparing the associated monitoring reports until such time that the following mitigation success criteria are achieved (criteria follow numbering system used in success criteria section):

1. General Construction – A and B (e.g. criteria 1.A and 1.B).
2. Topography – A and B (e.g. criteria 2.A and 2.B).
3. Native Vegetation – A and B (e.g. criteria 3.A and 3.B).
4. Invasive & Nuisance Vegetation – A (e.g. criterion 4.A), plus B (e.g. criterion 4.B) until such time as project is transferred to the NFS.

Monitoring events associated with the above will include the "time zero" (first or baseline) monitoring event plus annual monitoring events thereafter until the mitigation project is transferred to the NFS. Unless otherwise indicated herein, the NFS will be responsible for conducting the required monitoring events and preparing the associated monitoring reports after the USACE has demonstrated the mitigation success criteria listed above have been achieved.

Once monitoring responsibilities have been transferred to the NFS, the next monitoring event will typically take place during the year that attainment of success criterion 2.C (topography criterion applicable 3 years after completion of final mitigation construction activities) must be demonstrated, and the immediately subsequent monitoring event will typically take place during the year that attainment of success criterion 3.C (native vegetation criterion applicable 3 years after completion of initial plantings) must be demonstrated. Thereafter, monitoring will typically be conducted every 5 years until success criterion 3.D (native vegetation criterion applicable 4 years through 20 years following completion of initial marsh plantings) is fully satisfied.

If certain success criteria are not achieved, failure to attain these criteria would trigger the need for additional monitoring events not addressed in the preceding paragraphs. The USACE would be responsible for conducting such additional monitoring and preparing the associated monitoring reports under the following circumstances:

(A) If the initial survival criterion for planted species or the initial vegetative cover criterion are not achieved (i.e. the criteria specified in native vegetation success criterion 3.B), a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the applicable survival criterion or vegetative cover criteria have been satisfied (e.g. that corrective actions were successful). The USACE would also be responsible for the purchase and installation of supplemental plants needed to attain the success criteria.

(B) If topographic success criteria 2.A or 2.B are not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate the applicable criteria have been satisfied. Since failure to meet topographic success criteria would mandate corrective actions such as addition of fill, removal of fill, or other actions to change grades within the subject marsh feature, the USACE would also be responsible for performing the necessary corrective actions.

There could also be cases where failure to attain certain success criteria would trigger the need for additional monitoring events for which the NFS would be responsible. The NFS would be responsible for conducting such additional monitoring and preparing the associated monitoring reports under the following circumstances:

(A) If the vegetative cover criterion specified for 3 years after the initial planting of marsh features is not achieved (e.g. native vegetation success criterion 3.C), a monitoring report will be required for each consecutive year until two sequential annual reports indicate that the vegetative cover criterion has been satisfied. The NFS would also be responsible for the purchase and installation of supplemental plants needed to attain the success criterion.

(B) If the topographic success criterion 2.C is not achieved, a monitoring report will be required for each consecutive year until two sequential annual reports indicate success criterion has been satisfied. Since failure to meet this topographic success criterion would mandate corrective actions such as addition of fill, removal of fill, or other actions to change grades within the subject marsh feature, the NFS would also be responsible for performing the necessary corrective actions.

(C) Native vegetation success criterion 3.D is applicable to the period extending from 4 years through 20 years following completion of the initial marsh plantings and is applicable to all marsh features. If this criterion is not satisfied at the time of monitoring, the NFS would be responsible for implementing corrective actions. Such actions could include installing additional plants in the subject marsh (probable course of action), adding sediment to the subject marsh in problem zones (marsh nourishment), or a combination of these activities. Under this scenario, a monitoring report will be required for each consecutive year following completion of the corrective actions until two sequential annual reports indicate that the vegetative cover criterion has been attained. The NFS would be responsible for conducting these additional monitoring events and preparing the associated monitoring reports.

(D) Various unforeseen circumstances besides those above could severely threaten mitigation success. If one or more NFS monitoring reports called for in Table K-7 indicate mitigation success is severely threatened, as determined by the USACE in coordination with the HET and the NFS, then significant corrective actions (adaptive management) would be necessary. The need for such actions could trigger the need for additional monitoring/reporting events not listed in Table K-7, including the need to extend monitoring beyond the time period indicated in said table. The NFS would be responsible for conducting these additional monitoring events, preparing the associated monitoring reports, and conducting the required corrective actions. Necessary corrective actions would be determined by the USACE in coordination with the HET and NFS.

The following table indicates the currently anticipated monitoring report schedule and the party responsible for conducting the monitoring and preparing the report.

Table K-7. Standard mitigation monitoring report schedule and monitoring responsibility.

Year	Monitoring Report Number	Party Responsible for Monitoring and Reporting
1 (begin & complete initial construction activities; completion near end of year)	N/A	N/A
2 (begin & complete final construction activities; filled areas settle to final target grades near end of year)	1 (Time Zero Report)	USACE
3 (complete initial plantings early in year; complete initial invasive/nuisance plant eradication)	2	USACE
4 (1 year after initial plantings; 2 years after completion of final construction activities)	3	USACE
5 (Re-planting if necessary; 3 years after completion of final construction activities)	4	USACE if replanting necessary; NFS if replanting not necessary
6 (1 year after re-planting if re-planting needed)	5A*	USACE if replanting necessary in year 5. No report needed if replanting not necessary in year 5.
7 (2 years after re-planting if re-planting needed; 5 years after initial plantings)	5B	USACE if replanting necessary in year 5; NFS if replanting not necessary in year 5
12	6	NFS
17	7	NFS
22	8	NFS
27	9	NFS
32	10	NFS

It is noted that monitoring report 5A indicated in the preceding table will only be necessary if the third monitoring report indicates that native vegetation success criterion #3.B pertaining to the survival of planted species/percent cover by native plant species has not been achieved, thereby requiring re-planting in Year #5. If re-planting is unnecessary, there would be no monitoring in year 6. However, it has been assumed that some re-planting will be necessary. The schedule provided in the table does not account for the need to physically adjust topography in the mitigation features once final construction activities have been completed. Should such adjustments be necessary to achieve applicable topographic success criteria, then the monitoring schedule presented would likely require adjustments. The schedule provided also does not account for other unforeseen circumstances that may severely threaten mitigation success. Such circumstances would likely require corrective actions and could also require adjustments to the monitoring schedule, including extending the overall monitoring period.

Although the USACE will be responsible for conducting the monitoring necessary for monitoring reports 1 through 4 (as well as reports 5A and 5B if re-planting is necessary in year 5) 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 all monitoring reports following report 5B will be solely borne by the NFS. The same is true for conducting the monitoring and preparing the report called for in year 7 (report 5B) if no re-planting is required in year 5.

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. The mitigation construction schedule will be determined during the PED phase.

Once monitoring responsibilities have transferred to the NFS, the NFS will retain the ability to modify the monitoring plan and the monitoring schedule should this become necessary due to unforeseen events or to improve the information provided through monitoring. Fifteen 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 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 by the USACE in coordination with the HET and NFS.

8.4 MITIGATION MONITORING & REPORTING SCHEDULE AND RESPONSIBILITIES: DISTRICT CONSULTATION REPORTS AND USACE CIVIL WORKS PROJECT MITIGATION DATABASE REPORTS

The USACE will be responsible for preparing and submitting all District Consultation Reports. These reports will be submitted on annual basis beginning in the year the mitigation plan is implemented (i.e. start of mitigation construction) and continuing throughout the life of the mitigation monitoring period addressed in Section 8.3. The date for submittal of each report will be in accordance with guidance provided by MVD and/or HQUSACE (USACE Headquarters). Presently, MVD guidance is each annual report must be submitted at least 14 working days prior to October 1st each year; however, this guidance is subject to change.

The agencies involved in the consultation process will include, at a minimum: USACE, Mississippi Valley Division, New Orleans District (CEMVN); the Non-Federal Sponsor; US Fish and Wildlife Service (USFWS); National Marine Fisheries Service (NMFS); Louisiana Department of Wildlife and Fisheries (LDWF); Louisiana Department of Natural Resources (LDNR). The USACE will be responsible for conducting the consultation until the mitigation project is transferred to the Non-Federal Sponsor. Thereafter, the Non-Federal Sponsor will be responsible for conducting the consultation and for providing results of the consultation to USACE (i.e. Non-Federal Sponsor will be responsible for obtaining and providing to USACE all information necessary for preparing the District Consultation Report).

The USACE will be responsible for inputting all information required for the USACE's Civil Works Mitigation Project Database as regards this mitigation project. This information will be input by CEMVN on an annual basis beginning in the year the mitigation is implemented and continuing throughout the monitoring period addressed in Section 8.3. 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 Non-Federal Sponsor. Thereafter, the Non-Federal Sponsor will be responsible for gathering this information and providing it to CEMVN for input.

8.5 COST OF MITIGATION MONITORING AND REPORTING

The total cost of mitigation monitoring and reporting activities addressed herein is currently estimated to be approximately $7,660,800. This estimate includes all mitigation monitoring and reporting costs throughout the monitoring period addressed in Section 8.3. This estimate also 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/cover success criteria for planted native vegetation. If this assumption is erroneous, the estimated monitoring and reporting cost would decrease. This cost estimate does 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 also does not include additional monitoring and reporting costs that would be incurred should the adaptive management plan need to be implemented.

9. FINANCIAL ASSURANCES

Financial assurances are required to ensure that the compensatory mitigation project would be successful. In this case the Project Partnership Agreement (PPA) between the Non-Federal Sponsor and the Federal Government provides the required financial assurance for this mitigation project. In the event that the Non-Federal Sponsor fails to perform, the CEMVN has the right to complete, operate, maintain, repair, rehabilitate or replace any project feature, including mitigation features, but such action would not relieve the Non-Federal Sponsor of its responsibility to meet its obligations and would not preclude the US from pursuing any remedy at law or equity to ensure the Non-Federal Sponsor's performance.

10. DEFINITION OF TERMS

Certain terms used herein shall have the meaning discussed in the following subsections.

Habitat Evaluation Team (HET)

This interagency team consists of various staff from the following resource agencies: USACE, U.S. Fish and Wildlife Service (USFWS, or FWS), U.S Environmental Protection Agency (EPA), U.S. Geological Survey (USGS), Natural Resources Conservation Service (NRCS), Louisiana Coastal Protection and Restoration Authority (CPRA), Louisiana Department of Wildlife and Fisheries (LDWF), and Louisiana Department of Natural Resources (LDNR).

Non-Federal Sponsor (NFS)

This term refers to the Non-Federal Sponsor for the project. The Louisiana Coastal Protection and Restoration Authority Board (CPRAB) and the Terrebonne Levee and Conservation District (TLCD) intend to be the non-Federal co-sponsors for the project. Despite there really being two non-Federal sponsors in this case, the singular term "Non-Federal Sponsor" (NFS) is used herein to refer to the two co-sponsors.

Invasive Plant Species

All plant species 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.
> (Website - http://is.cbr.tulane.edu/docs_IS/LAISMP7.pdf)
>
> Barataria-Terrebonne National Estuary Program (BTNEP). 2012. Exotic Invasive Species of the Barataria-Terrebonne, Invasive Species in Louisiana. BTNEP, Thibodaux, LA. (Website - http://invasive.btnep.org/invasivesvsnatives/invasivesinla2list.aspx)

In addition, invasive plant species include; 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*).

Nuisance Plant Species

Nuisance plant species will include native species deemed detrimental due to their potential adverse competition with desirable native species. Nuisance plant species identified for the mitigation project include; dog-fennel (*Eupatorium* spp.), ragweed (*Ambrosia* spp.), 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.), black willow (*Salix nigra*), and box elder (*Acer negundo*). Following completion of the initial mitigation activities (e.g. placement of fill, initial plantings), the preceding list may be expanded to include other nuisance plant species. Any such addition to the list would be based on the results of the standard monitoring reports. The determination of whether a particular new plant species should be considered as a nuisance species and therefore eradicated or controlled would be determined by the USACE in coordination with the Non-Federal Sponsor and Interagency Team.

Native Plant Species

This category includes all plant species that are not classified as invasive plant species and are not considered to be nuisance plant species.

USACE Hydrophytic Vegetation Criteria

Reference to satisfaction of 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

The wetland indicator status of plants is 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 (the “2012 National Wetland Plant List”) using the Region 2 listing contained therein. However, if the USACE approves and adopts a new list in the future, then the currently approved list will apply.

> Lichvar, Robert W. and J.T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, version 2.4.0 (https://wetland_plants.usace.army.mil). USACE, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH and BONAP, Chapel Hill, NC.

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.

Interspersion Features

This term refers to shallow open water features situated within marsh habitats. Examples include tidal channels, creeks, trenasses, and relatively small, isolated ponds. Emergent vegetation is typically absent in such features although they may contain submerged aquatic vegetation. They provide areas of foraging and nursery habitat for fish and shellfish along with associated predators, and provide loafing areas for waterfowl and other waterbirds. The marsh/open water interface forms an ecotone where post-larval and juvenile organisms can find cover and where prey species frequently concentrate.

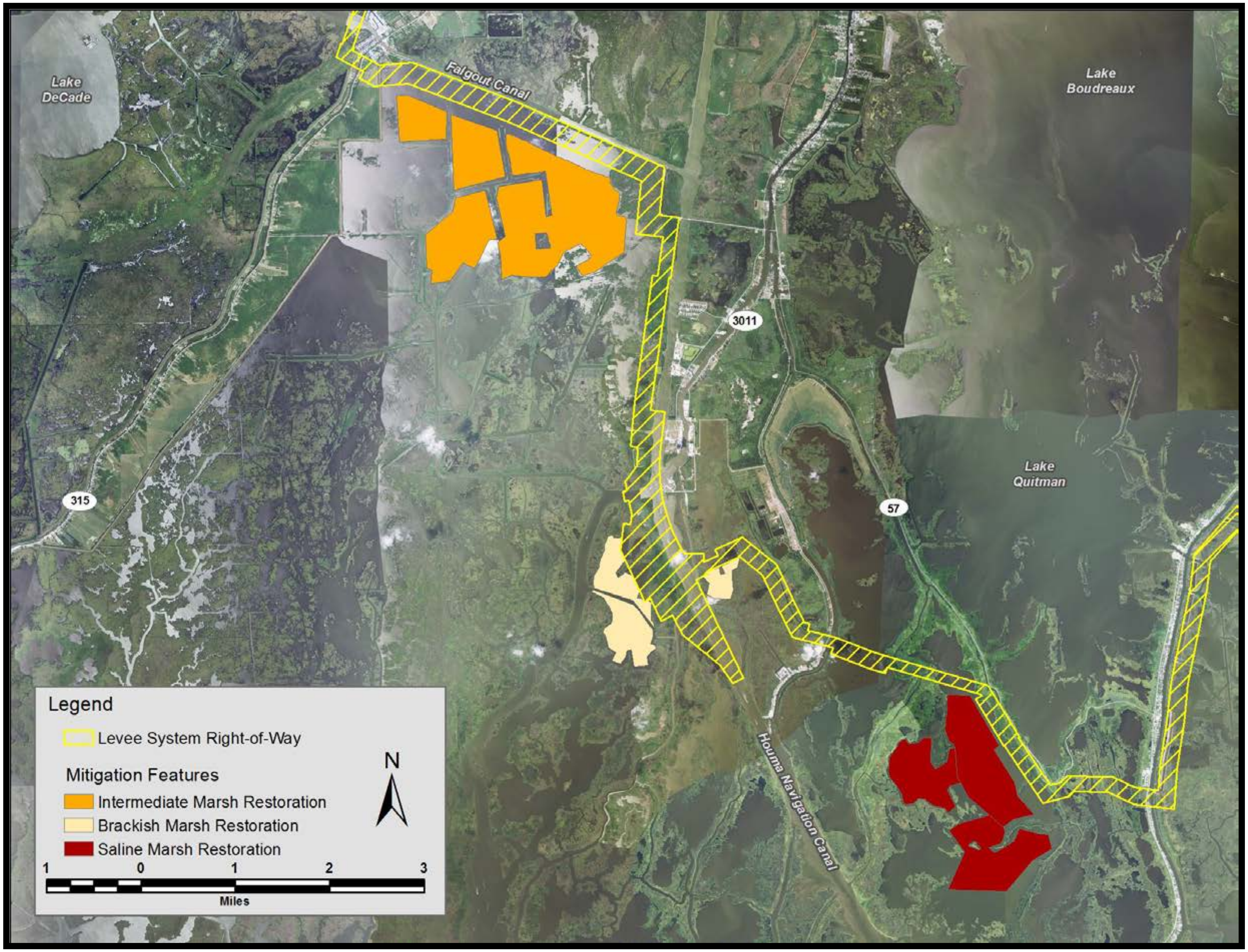

Figure K1. Overview of all proposed mitigation features.

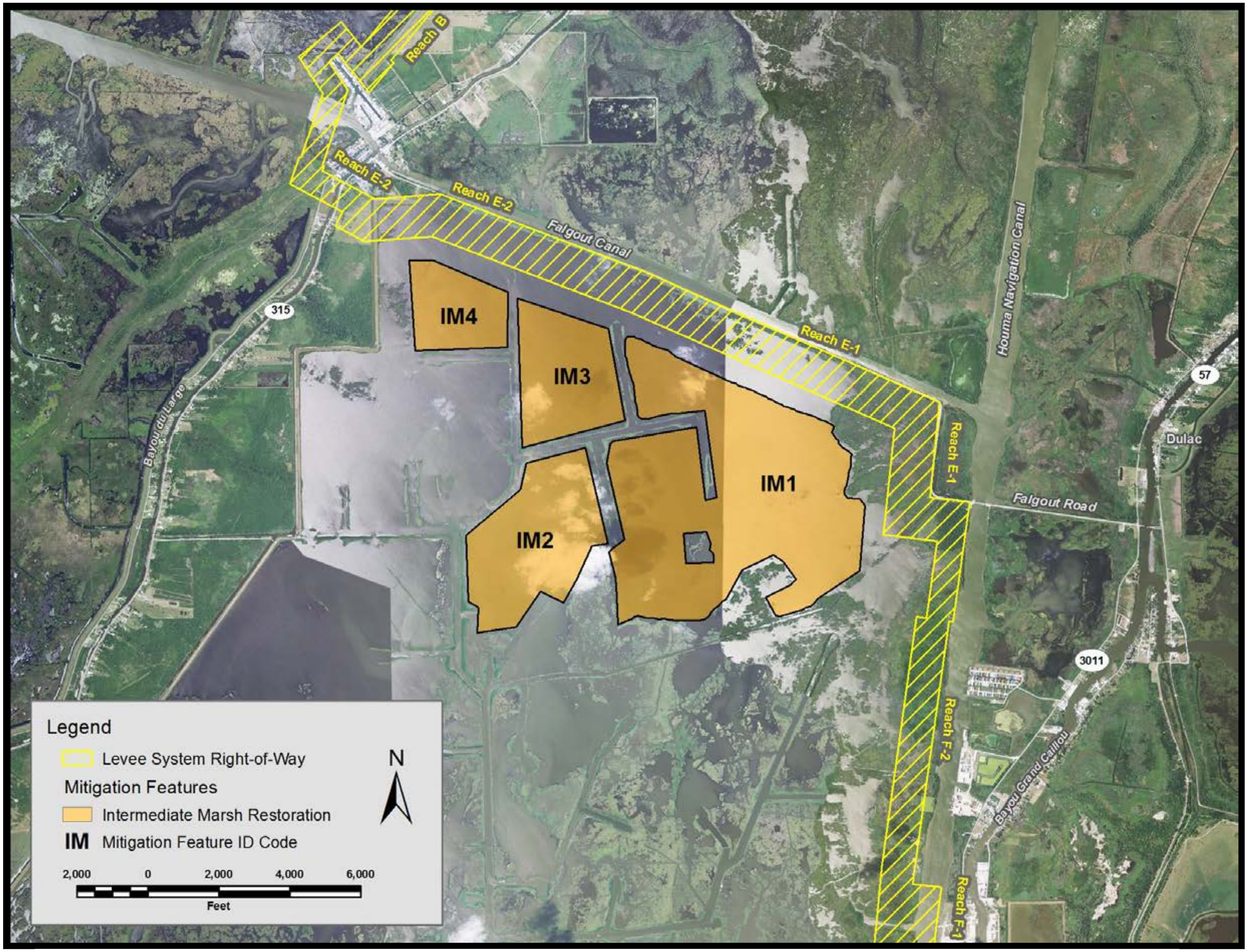

Figure K2. Proposed mitigation features: Intermediate marsh restoration features IM2 (293 ac.), and IM4 (134 ac.). IM1 and IM3 will not be used as part of the mitigation plan at this time.

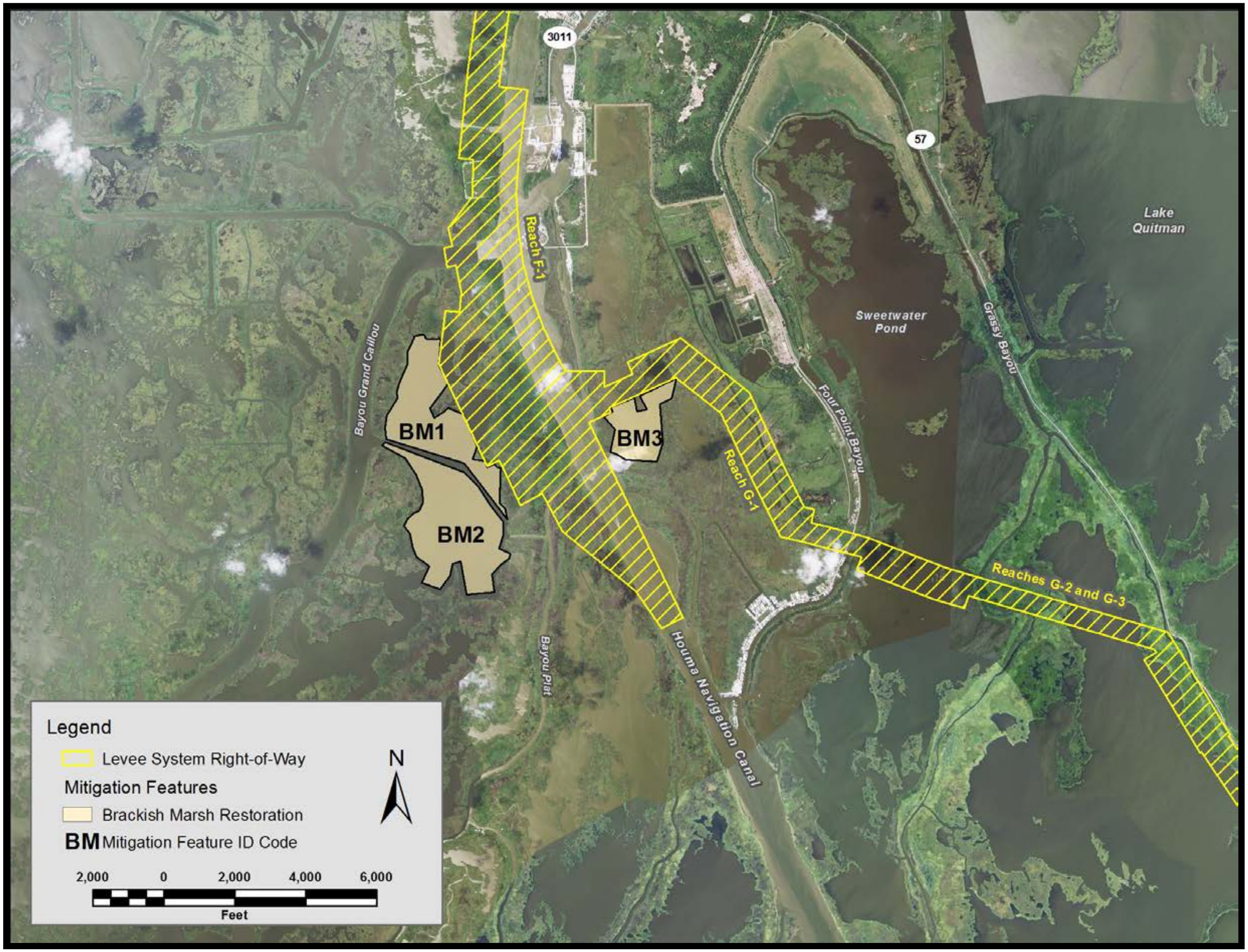

Figure K3. Proposed mitigation features: Brackish marsh restoration features BM1 (129 ac.), BM2 (170 ac.), And BM3 (59 ac.).

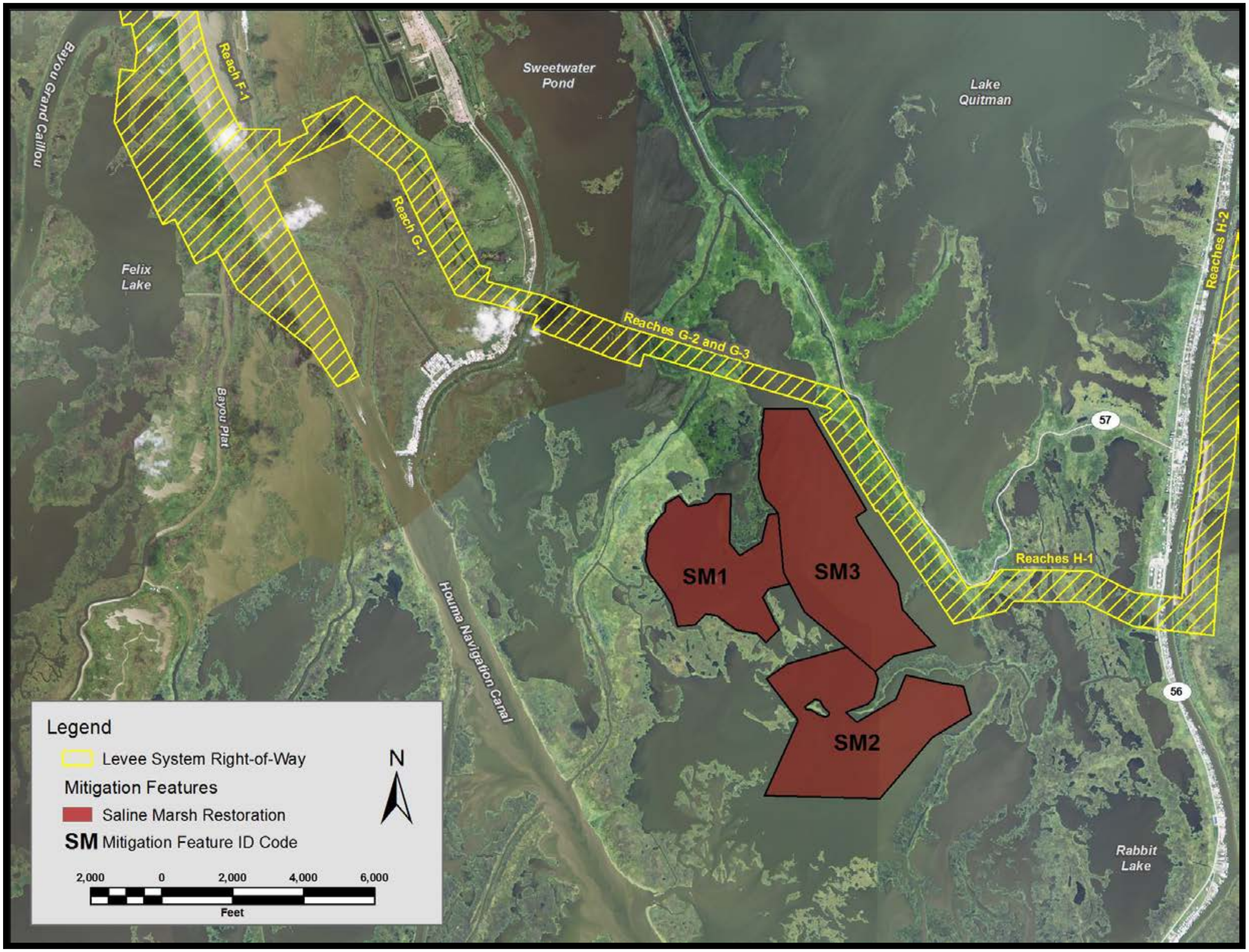

Figure K4. Proposed mitigation features: Saline marsh restoration features SM1 (241 ac.), SM2 (342 ac.), and SM3 (392 ac.). Note that these features would likely be built as a single saline marsh totaling 832

Appendix L

PHASE I ENVIRONMENTAL SITE ASSESSMENT

FINAL
PHASE I ENVIRONMENTAL SITE ASSESSMENT
MORGANZA, LOUISIANA TO THE GULF OF MEXICO
TERREBONNE AND LAFOURCHE PARISHES, LOUISIANA
CONTRACT NUMBER: W-912P8-07-D-0057
TASK ORDER NUMBER: 0047

PREPARED FOR:

United States Army Corps of Engineers, Mississippi Valley Division,
New Orleans District (USACE-MVN)
7400 Leake Avenue
New Orleans, Louisiana 70118

PREPARED BY:

Aerostar Environmental Services, Inc.
11181 St. Johns Industrial Parkway North
Jacksonville, Florida 32246
(904) 565-2820

AES Project Number 0810-265-02

May 3, 2011

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LIST OF ABBREVIATIONS

AAI	All Appropriate Inquiry
AEROSTAR	Aerostar Environmental Services, Inc.
AI#	Agency Interest Number
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AULs	Activity and Use Limitations
BLS	Below Land Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CORRACTS	RCRA Corrective Action
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
ESRI	Environmental Systems Research Institute
FTC	FirstSearch Technology Corporation
GIWW	Gulf Intracoastal Waterway
IC/EC	Institutional Controls/Engineering Controls
LDEQ	Louisiana Department of Environmental Quality
LDNR	Louisiana Department of Natural Resources
LPDES	Louisiana Pollutant Discharge Elimination System
LSU	Louisiana State University
LUST	Leaking Underground Storage Tank
MCL	Maximum Contaminant Level
NFA-ATT	No Further Action at This Time
NFRAP	No Further Remedial Action Planned
NGVD	National Geodetic Vertical Datum
NPHC	Non-Petroleum Hydrocarbons
NPL	National Priority List
NRCS	Natural Resource Conservation Services
PCB	Polychlorinated Biphenyls
PRC	Property Record Card
RCRA	Resource Conservation and Recovery Act
RCRA CESQG	RCRA Conditionally Exempt Small Quantity Generator
RCRAGN	RCRA Generator
RCRA-LQG	RCRA Large Quantity Generators
RCRA-SQG	RCRA Small Quantity Generators
RCRA TSD	RCRA Treatment, Storage and Disposal
SWF/LF	Solid Waste Facilities/Landfills
SWF	Solid Waste Facilities
SHWS	State Hazardous Waste Sites
TSD	Treatment, Storage and Disposal
USACE-MVN	United States Army Corps of Engineers, Mississippi Valley Division, New Orleans District
USGS	United States Geological Survey
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compounds

1.0 EXECUTIVE SUMMARY

1.1 Site Name

Morganza, Louisiana to the Gulf of Mexico
Terrebonne and Lafourche Parish, Louisiana

1.2 Inspection Date(s)

July 19-23, 2010

1.3 Name of Inspector(s)

Cherie O'Riordan, Samuel Stuart, and Christopher Whitehead

1.4 Client and User

Client: United States Army Corps of Engineers, Mississippi Valley Division, New Orleans District
User: United States Army Corps of Engineers, Mississippi Valley Division, New Orleans District

1.5 Site Description and General Observations

At the request of the United States Army Corps of Engineers, Mississippi Valley Division, New Orleans District (USACE-MVN), the site corridor consisted of the existing levee and proposed levee 500 feet on either side of the centerline of the alignment. AEROSTAR subdivided the site corridor into three segments titled Section A, Section B, and Section C. Under these designations, Section A consisted of USACE Reaches A and B as well as the alignment entitled the Barrier Plan; Section B consisted of USACE Reaches E-1, E-2, F-1, F-2, G-1, G-2 (Alternative Alignment 1), G-3 (Alternative Alignment 2), H-1, H-2, H-3, I-1, I-2, and I-3; and Section C consisted of USACE Reaches J-1, J-2, J-3, K, and L.

1.5.1 Section A

From 29° 40' 19.62" N, 91° 0' 28.22 W, to 29° 24' 32.20" N, 90° 46' 48.18" W, Section A consisted of an approximate 30.8-mile corridor of levee and undeveloped land located in USACE Reach A and B west of Bayou Dularge Road (Parish Road 315) as well as the Barrier Plan alignment west of Bayou Black Drive (Parish Road 182). The northern terminus of Section A is located at Bayou Black and is occupied by undeveloped land. The southern terminus of Section A is located south of the Falgout Canal Marina at Bayou Dularge. The Barrier Plan alignment consists of undeveloped land, commercial-industrial with mixed rural-residential properties, and the Northeast Gibson Oil and Gas Field. Reach A consists of agricultural land, the GIWW, the Sunrise Oil and Gas Field and undeveloped wetland. Reach B consists of agricultural land, existing levee, the Marmande Canal, the Falgout Canal, the Falgout Canal Marina and the Upper Bayou Dularge Pump Station.

The Barrier Plan is bordered by US Highway 90 followed by undeveloped land to the northwest; commercial-industrial and mixed rural-residential land to the northeast; Reach A to the southeast; and undeveloped wetlands to the southwest, except the Gibson Oil and Gas Field in the central portion, and the Humphreys Oil and Gas Field and Orange Grove Oil and Gas Field in the southern portion.

Reach A is bordered by the Barrier Plan alignment to the north; rural-residential and agricultural land to the east, except for undeveloped wetlands and the Sunrise Oil Field in the central portion; Reach B to the south; and undeveloped wetlands to the west, except the Sunrise Oil Field in the central portion.

Reach B is bordered by Reach A to the north; rural-residential and agricultural land to the east; and undeveloped wetlands to the west and south.

Based on the review of aerial photographs and historical topographic maps, the historical development of Section A appeared as primarily undeveloped land and wetlands in 1892 in the northern portion and 1894 in the southern portion. Section A appeared as undeveloped wetlands with agricultural development along the eastern portion to the north and center of the segment while still undeveloped in the southern portion of the segment in 1940. The North Terrebonne Gas Plant, the Falgout Canal, and Brady Road have been visible since 1944 in the southern portion of the segment. The Transcontinental Pipeline Company, the Northeast Gibson Oil and Gas Field, Waterproof Ridge Farm and the Sunrise Oil and Gas Field have been developed at the site since at least 1964. The Falgout Canal Marina has been developed since at least 1971. Bob’s Bayou Black Marina and the existing levees have been developed since at least 1981.

1.5.2 Section B

From 29° 24' 32.20" N, 90° 46' 48.18" W, to 29° 26' 14.97" N, 90° 33' 54.52" W, Section B consisted of an approximate 28-mile segment of levee and proposed levee located in Reaches E, F, G, H, and I. The western terminus of Section B is located on the east side of Bayou Dularge, Bayou Dularge Road and Brady Road. The eastern terminus of Section B is located south of Humble Canal and Humble Canal Road. Reaches E-1 and E-2 adjoin Falgout Canal in the western portion of the segment. Reaches F-1 and F-2 adjoin the Houma Navigational Canal with Reach F-2 crossing the Houma Navigational Canal. Two alternate alignments, Alternate Alignment 1 and Alternate Alignment 2, extend eastward from Reach G-1. Alternate Alignment 1, the northerly alternate alignment, crosses Sweetwater Pond and connects to Reach G-3. Alternate Alignment 2, the southerly alternate alignment, extends from Reach G-2 in the middle of Sweetwater Pond to Reach G-3 along State Highway 57 (Bayou Sale Road). Reaches G-3 and H-1 follow a portion of Highway 57. Reach H-1 includes a small Federal Aviation Administration (FAA) air traffic control facility and crosses a Plains All American Pipeline oil/gas facility, located on State Highway 56 (Little Caillou Road). Reaches H-2 and H-3 follow Bayou Petite Caillou in a northeasterly direction and include residential and commercial properties along State Highway 56 (Little Caillou Road). Reaches H-3, I-1, I-2 and I-3 generally follow Bayou Terrebonne. Reaches I-2 and I-3 include residential and commercial properties along State Highway 55 (Montegut Road). Reach I-2 includes the Bayou Terrebonne Floodgate. Reach I-3 terminates south of Humble Canal and Humble Canal Road.

The reaches of the Section B segment are bordered by the following:

Reach E-1 is bordered by undeveloped land and wetlands to the north, east, south and west.

Reach E-2 is bordered by residential and undeveloped land and wetlands to the north and south; wetlands to the east; and undeveloped land and wetlands to the west.

Reach F-2 is bordered by undeveloped land and wetlands to the north; undeveloped land, wetlands, Falgout Canal Road and the Houma Navigational Canal to the east; and undeveloped land and wetlands to the south and west.

Reach F-1 is bordered by undeveloped land and wetlands to the north; Houma Navigational Canal to the east; undeveloped land, wetlands, and the Houma Navigational Canal to the south; and undeveloped land and wetlands to the west.

Reach G-1 is bordered by undeveloped land and wetlands to the north; undeveloped land, wetlands, Four Point Road, and residences to the east; undeveloped land, wetlands, and residence to the south; and undeveloped land and wetlands to the west.

Reach G-2 is bordered by undeveloped land, wetlands, residences and Four Point Road to the north; undeveloped land, wetlands and State Highway 57 (Bayou Sale Road) to the east: undeveloped land, wetlands, residences and Four Point Road to the south; and undeveloped land and wetlands to the west.

Alternate Alignment 1 is bordered by State Highway 57 (Bayou Sale Road), Sweetwater Pond, undeveloped land and wetlands to the north; undeveloped land and wetlands to the east; State Highway 57 (Bayou Sale Road), undeveloped land, wetlands and Sweetwater Pond to the south; and undeveloped land and wetlands to the west.

Alternate Alignment 2 is bordered by undeveloped land, Sweetwater Pond and wetlands to the north and south; State Highway 57 (Bayou Sale Road), undeveloped land and wetlands to the east; and Sweetwater Pond to the west.

Reach G-3 is bordered by State Highway 57 (Bayou Sale Road), undeveloped land and wetlands to the north and south; and undeveloped land and wetlands to the east and west.

Reach H-1 is bordered by Highway 57 (Bayou Sale Road), residential land, undeveloped land and wetlands to the north; undeveloped land and marsh land to the east; part of the Plains All American Pipeline Facility, Cocodrie Station, undeveloped land and wetlands to the south; and undeveloped land and wetlands to the west.

Reach H-2 is bordered by undeveloped land and wetlands, residential land, and Lapeyrouse Seafood Bar and Restaurant to the north; undeveloped land and wetlands to the east; part of the Plains All American Pipeline Facility, Cocodrie Station, undeveloped land and wetlands to the south; and residential and commercial land and Lapeyrouse Campground to the west.

Reach H-3 is bordered by residential and commercial land, undeveloped land, wetlands, and Bayou Terrebonne to the north; undeveloped land and wetlands to the east; residential and commercial land and Lapeyrouse Campground to the south; and Lapeyrouse Seafood Bar and Grocery, residences, Castex Energy - Lapeyrouse Commingling Facility, La Butte Indian Mound and Elpege Picou cemetery, and residential and commercial land to the west.

Reach I-1 is bordered by Bayou Terrebonne Floodgate to the north; undeveloped land, wetlands, and residential land to the east; undeveloped land, wetlands and Bayou Terrebonne to the south; and undeveloped land and wetlands to the west.

Reach I-2 is bordered by undeveloped land and wetlands land to the north; undeveloped land and wetlands to the east; undeveloped land and wetlands, residential land, Bayou Terrebonne Floodgate, undeveloped land and wetlands to the south; and undeveloped land, wetlands, State Highway 55 (Montegut Road) and Bayou Terrebonne to the west.

Reach I-3 is bordered by Humble Canal Road, Humble Canal, and undeveloped land to the north; undeveloped land and wetlands, Humble Canal, and Humble Canal Road to the east; undeveloped land, wetlands and residential land to the south; State Highway 55 (Montegut Road), residential land, a fire station, and a vacant community center to the west.

Based on the review of aerial photographs and historical topographic maps, the historical development of Section B appeared as primarily undeveloped land and wetlands with Four Point Road, State Highways

55, 56 and 57, Bayou Dularge, and Bayou Terrebonne crossing or adjoining the segment since at least 1893. Falgout Canal and Brady Road, in the western portion of the segment, and Humble Canal and Point Barre Road, in the eastern portion of the segment, have been visible since 1944. Falgout Canal Road was under construction by 1964 and completed by 1971. Houma Navigational Canal, which crosses and adjoins Section B in the western portion of the segment, has been visible since 1964. The present-day Plains All American crude oil pipeline transportation facility, located where Reaches H-1 and H-2 meet, has been visible since 1971. The present-day FAA Air Traffic Control facility has been visible since 1990. The Bayou Terrebonne Floodgate, in the eastern portion of the segment, has been visible since 1998. The present-day Shell Pipeline Co. Lake Barre Booster Station has been visible since 1998.

1.5.3 Section C

From, 29° 26' 7.35" N, 90° 33' 49.73" W to 29° 30' 55.66" N, 90° 21' 18.32" W, Section C consisted of an approximate 21-mile corridor of levees and proposed levees located in Reaches J, K, and L. The western terminus of Section C is located at Humble Canal. The eastern terminus of Section C is located at the Lafourche Parish levee near State Highway 3235. The central portion of Reach J-2 extends across undeveloped land and wetlands, north of Wonder Lake. The eastern portion of Reach J-2 adjoins Reach J-1 near the Bayou Pointe aux Chenes along State Highway 665 (Pointe Aux Chene Road). Reach J-1 extends southeast following Bayou Pointe aux Chenes and State Highway 665. Reach J-1 terminates at a pump station and Island Road. Reaches J-2 and J-1 include residential and commercial properties along State Highway 665. Reach J-3 extends south from Island Road, intersecting a pump station and terminating at the Pointe Aux Chene Marina. Reach J-3 includes both residential and commercial properties along Bayou Pointe aux Chenes and State Highway 665. Reaches K and L extend northeast from the Pointe Aux Chene Marina following the Grand Bayou Canal and Cut Off Canal. Reach L-3 extends east from Grand Bayou Canal and terminates along the Lafourche Parish levee, west of State Highway 3235.

The reaches of Section C are bordered by the following:

The western portion of Reach J-2 is bordered by gas platforms and undeveloped land and wetlands to the north and south. Reach J-2 is bordered by residential properties, undeveloped land, and wetlands to the east and west.

Reach J-1 is bordered by undeveloped land and wetlands to the north and south; residential properties to the east, followed by State Highway 665 and Bayou Pointe aux Chenes; and undeveloped land to the west.

Reach J-3 is bordered by undeveloped land and wetlands to the north, south, and west; and residential and commercial properties to the east.

Reach K is bordered by the Pointe Aux Chene Marina, undeveloped land, and wetlands to the south; and undeveloped land and wetlands to the north, east, and west.

Reach L is bordered by undeveloped land and wetlands to the north, east, south, and west.

Reach L-3 is bordered by undeveloped land and wetlands to the north, east, south, and west.

Based on the review of aerial photographs and historical topographic maps, the historical development of Section C appeared as primarily undeveloped land and wetlands from 1894 to at least 1941. Levees along State Highway 665, located within Reaches J-1, J-2, and J-3, have been visible since 1980. Reaches K, L, and L-3 have been undeveloped and wetlands since at least 1894. Reaches J-1, J-3, and the eastern portion of J-2 have been developed residentially and commercially since at least 1953.

1.6 Findings and Conclusions

AEROSTAR has performed a Phase I ESA in conformance with the scope and limitations of ASTM Standard E 1527-05 of the proposed Morganza, Louisiana to the Gulf of Mexico project area located in Terrebonne and Lafourche Parishes, Louisiana, hereafter referred to as the site. Any exceptions to, or deletions from, this practice are described in Section 2 of this report. The Executive Summary serves as a summary of this report and presents the significant findings, conclusions and recommendations. The Executive Summary should not be considered a stand-alone document and must be evaluated in conjunction with the discussions, supporting documentation, and limitations within this ESA report.

The recognized environmental conditions are summarized in Tables 1A through 1C. AEROSTAR recommends that these conclusions be reviewed again as soon as 60% construction plans are available.

1.6.1 Section A

This assessment has revealed no evidence of recognized environmental conditions in connection with Section A, except for the following:

- Section A, Site 1 (29° 38' 33.90" N, 90° 57' 48.82” W): The facility is an off-site RCRA-SQG and AST facility identified in the LDEQ EDMS as containing large volumes of several hazardous materials or petroleum products; soil and groundwater sampling is on-going at the facility.

- Section A, Site 2 (29° 38' 15.9" N, 90° 57' 44.5" W): One approximate 250-gallon AST was observed at an unnamed pumping station.

- Section A, Site 3 (29° 37' 52" N, 90° 57' 1.4" W): An approximate 250-gallon AST was observed at a residence along an outfall canal associated with existing levee; an abandoned drum was observed in the canal adjacent to the AST.

- Section A, Site 4 (29° 37' 43.76" N, 90° 56' 40.39" W): Three fuel storage tanks ranging in size from approximately 250 gallons to 1,000 gallons were observed at Bob’s Bayou Black Marina.

- Section A, Site 5 (29° 37' 44.52" N, 90° 56' 43.01” W): Approximately 26 steel and polycarbonate drums were observed at the Petro Quest Energy, LLC facility; three drums were observed buried under heavy brush approximately 100 feet northwest of this facility.

- Section A, Site 6 (29° 37' 46.29" N, 90° 55' 57.27” W): Multiple storage tanks, including three bulk storage tanks approximately 100,000 gallons in size containing crude oil; and several unidentified storage tanks ranging from approximately 500 gallons to 10,000 gallons in size; were observed on the property. Distillation columns, as well as several thousand linear feet of pipeline, were observed at this RCRA-LQG.

- Section A, Site 7 (29° 36' 8.11" N, 90° 52' 33.88” W): Two high-pressure tanks approximately 5,000 and 10,000 gallons in size, four vertical storage tanks approximately 2,000 gallons in size, and several thousand linear feet of pipeline were observed at this RCRA-CESQG and AST facility; groundwater and soil sampling is on-going based on an existing consent decree against the facility.

- Section A, Site 8 (29° 34' 54.31" N, 90° 49' 28.34” W): Two 5,000-gallon and two 1,000-gallon ASTs containing Avgas, gas, and diesel are listed for this facility.

- Section A, Site 9 (29° 32' 46.35" N, 90° 48' 3.81" W): An on-site concern was noted from the Waterproof Ridge Farm, an AST facility, located in the northern portion of the segment.

- Section A, Site 10 (29° 28' 51.60" N, 90° 45' 40.90” W): An on-site concern was noted from nuisance dumping consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, in the central portion of the segment.

- Section A, Site 11 (29° 27' 42.48" N, 90° 45' 49.49" W): An on-site concern was noted from six weathered, empty 55-gallon drums observed in the vicinity of a proposed culvert with sluice gates in the central portion of the segment.

- Section A, Site 12 (29° 25' 2.76" N, 90° 47' 3.56" W): An on-site concern was noted from the Upper Bayou Dularge Pump Station, an AST facility, located in the southern portion of the segment.

- Section A, Site 13 (29° 24' 47.95" N, 90° 47' 1.24" W): An on-site concern was noted from the Falgout Canal Marina, an AST facility, located in the southern portion of the segment.

- Section A, Site 14 (29° 24' 37.70" N, 90° 47' 13.21" W): An on-site concern was noted from an unlabeled, approximate 5,000-gallon AST observed outside the Frogco Amphibious Equipment facility. The AST appeared to be stored on the grass.

- Section A: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within Section A.

- Section A: Off-site concerns were noted from eight former and present oil and/or gas well locations identified within 500 feet of Section A (1,000 feet from the centerline of the alignment).

1.6.2 Section B

This assessment has revealed no evidence of recognized environmental conditions in connection with Section B, except for the following:

- Section B, Site 1 (29° 24' 36.41" N, 90° 47' 11.46" W). An on-site concern was noted from the presence of an approximate 5,000-gallon, unlabeled AST observed within a roofed, secondary containment area outside a building without signage on Janet Lynn Drive within Reach E-2.

- Section B, Site 2 (29° 17' 54.89" N, 90° 38' 58.85" W): An on-site concern was noted from six ASTs, approximately 300,000 gallons each, observed from the road at Plains All American Pipeline, Cocodrie Station, 7394 Highway 56, within Reach H-1. The facility is listed as a crude oil pipeline transportation facility.

- Section B, Site 3 (29° 17' 56.76" N, 90° 38' 55.55" W): An on-site concern was noted from an AST and two 55-gallon drums at the Shell Pipeline Company, LP, Lake Barre Booster Station Dock, within Reach H-1. The approximate 5,000-gallon AST was observed from the road and the 55-gallon drums, labeled heavy engine oil and oil, were observed adjoining the facility’s entrance.

- Section B, Site 4 (29° 18' 27.36" N, 90° 38' 50.55" W): An on-site concern was noted from three ASTs observed at Cecil Lapeyrouse Grocery, 7243 Shoreline Drive, within Reach H-2. One AST, approximately 1,500-gallons in size, contained diesel. Two ASTs, approximately 5,000 gallons each, contained unleaded gasoline. The tanks were stored on the gravel parking lot.

- Section B, Site 5 (29° 18' 37.93" N, 90° 38' 48.86" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled, rusted AST observed from the road outside a building without signage on Shoreline Drive, within Reach H-2.

- Section B, Site 6 (29° 19' 30.68" N, 90° 38' 38.38" W): An on-site concern was noted from an approximate 2,000-gallon, unlabeled, AST observed from the road at a building without signage in the southeastern quadrant of Riggio Street and Driftwood Street, within Reach H-2.

- Section B, Site 7 (29° 19' 58.90" N, 90° 38' 35.26" W): An on-site concern was noted from an approximate 7,500-gallon, unlabeled AST, stored inside a concrete vault, at the Lapeyrouse Seafood Bar and Grocery on Little Caillou Road, within Reach H-3.

- Section B, Site 8 (29° 20' 12.86" N, 90° 38' 20.44" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled AST observed at Sportsman's Paradise, 6830 Highway 56 (Little Caillou Road), within Reach H-3.

- Section B, Site 9 (29° 21' 12.07" N, 90° 37' 33.94" W): An on-site concern was noted from two unlabeled ASTs, approximately 1,000 and 5,000 gallons each in size, observed from the road outside a building without signage on Little Caillou Road, within Reach H-3.

- Section B, Site 10 (29° 23' 25.70" N, 90° 35' 13.59" W): An on-site concern was noted from three ASTs, labeled diesel and unleaded gasoline, approximately 20,000 gallons each in size, and an approximate 500-gallon, unlabeled AST observed outside Madison Seafood, 2166 Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 11 (29° 23' 46.92" N, 90° 35' 09.72" W): An on-site concern was noted from four, approximate 7,500-gallon, unlabeled ASTs observed from the road at the Castex Energy, Inc. facility on State Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 12 (29° 23' 59.69" N, 90° 35' 01.39" W): An on-site concern was noted from dumped debris observed in the marsh along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 13 (29° 24' 09.36" N, 90° 34' 55.43" W): An on-site concern was noted from numerous five-gallon containers, labeled hydraulic oil and engine oil, observed along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 14 (29° 24' 19.30" N, 90° 34' 29.38" W): An on-site concern was noted from an approximate 2,000-gallon AST for the Madison Pump Station, observed by helicopter on a levee, within Reach I-2.

- Section B, Site 15 (29° 25' 30.07" N, 90° 34' 01.75" W): An on-site concern was noted from a marked petroleum pipeline observed crossing State Highway 55 (Montegut Road), within Reach I-3.

- Section B, Site 16 (29° 18' 28.29" N, 90° 38' 49.44" W): An on-site concern was noted from Little Caillou Packing Company, identified as an Emergency Response Notification System (ERNS) facility, located at 7241 Shoreline Drive, within Reach H-2. A 600-gallon discharge of a petroleum product from a portable tank discharge line was reported at this facility on December 14, 1995. Database information indicates the leak was "secured;" however, no additional information was available concerning this incident.

- Section B, Site 17 (29° 20' 19.15" N, 90° 38' 13.71" W): An on-site concern was noted from an unnamed facility, identified as an ERNS facility, located at 6809 Highway 56, within Reach H-3. A transformer oil leak was reported at this address. No additional information was available about the incident.

- Section B, Site 18: An on-site concern was noted from a dump site previously identified along Falgout Canal Road in a September 1997 *Final Report for Hazardous, Toxic, and Radioactive (HTRW) Investigations* that covered portions of the corridor. While the exact location of the dump site was not noted in the report, it was notated on a small scale map and appears to have been located within Reaches E-1 or E-2. At the time of the 1997 assessment, the dump consisted of automobile tires, metal and wood construction debris, six, unlabeled, empty 55-gallon drums, several, empty five-gallon containers, and some areas of distressed vegetation and stained soil. AEROSTAR did not locate this dump during the current site investigation.

- Section B, Site 19 (29° 20' 08.58" N, 90° 38' 29.07" W): An off-site concern was noted from several large ASTs, approximately 50,000 gallons each in size, observed from the road at the Castex Energy, Inc., Lapeyrouse Commingling Facility on 6848 State Highway 56 (Little Caillou Road), adjoining Reach H-3 to the north.

- Section B: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within the Section B segment (500 feet from the centerline of the alignment).

- Section B: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section B segment (1,000 feet from the centerline of the alignment).

- Section B: On-site concerns were noted from 19 pipeline permits identified within the Section B segment (500 feet from the centerline of the alignment).

1.6.3 Section C

This assessment has revealed no evidence of recognized environmental conditions in connection with Section C, except for the following:

- Section C, Site 1 (29° 25 '20.64" N, 90° 26' 47.76" W): An on-site concern was noted from an approximate 1,500-gallon, abandoned AST observed along the levee, within Reach K.

- Section C, Site 2 (29° 25' 53.76" N, 90° 27' 39.60" W): An on-site concern was noted from an unlabeled 55-gallon poly-drum observed in the drainage canal near Island Road, within Reach J-3.

- Section C, Site 3 (29° 25' 59.17" N, 90° 27' 38.54" W): An on-site concern was noted from an approximate 2,000-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-1.

- Section C, Site 4 (29° 25' 29.27" N, 90° 27' 15.17" W): An on-site concern was noted from an approximate 500-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-3.

- Section C, Site 5 (29° 25' 41.91" N, 90° 27' 21.94" W): An on-site concern was noted from two ASTs, approximately 10,000 gallons each in size, observed outside a commercial fishing business, along State Highway 665 and Bayou Pointe aux Chenes, within Reach J-3.

- Section C, Site 6 (29° 30' 55.10" N, 90° 22' 30.86" W): An on-site concern was noted from three diesel ASTs, approximately 500 gallons, 1,000 gallons, and 2,000 gallons in size, observed outside a drainage canal pump station, within Reach L-3.

- Section C, Site 7 (29° 24' 59.60" N, 90° 26' 51.62" W): An on-site concern was noted from three diesel ASTs, approximately 1,000 gallons and two 2,000 gallons in size, observed in the Pointe Aux Chene Marina.

- Section C, Site 8 (29° 25' 56.46" N, 90° 27' 40.24" W): An on-site concern was noted from a marked petroleum pipeline observed extending northwest to southeast, within Reach J-1 and J-3.

- Section C: On-site concerns were noted from 14 former and present oil and/or gas well locations identified within the Section C segment.

- Section C: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section C segment (1,000 feet from the centerline of the alignment).

- Section C: On-site concerns were noted from 15 pipeline permits identified within the Section C segment (500 feet from the centerline of the alignment).

1.7 Recommendations

During the site investigation, existing levees were observed in various locations along the site corridor. The sources of the fill material used to construct the levees were not identified during this investigation and may present a non-scope consideration under ASTM E 1527-05. Therefore, while the existing levees were not assessed as a recognized environmental condition, due to the unknown quality of the fill material it is recommended any off-site transport or disposal actions involving this material follow associated non-scope guidelines.

1.7.1 Section A

Based on the information reviewed during this assessment, no additional investigation is recommended at this time. During the project's pre-construction phase and parcel right-of-way acquisition, soil and groundwater assessment may be warranted at that time to address the recognized environmental conditions identified during this investigation.

1.7.2 Section B

Based on the information reviewed during this assessment, no additional investigation is recommended at this time. During the project's pre-construction phase and parcel right-of-way acquisition, soil and groundwater assessment may be warranted at that time to address the recognized environmental conditions identified during this investigation.

1.7.3 Section C

Based on the information reviewed during this assessment, no additional investigation is recommended at this time. During the project's pre-construction phase and parcel right-of-way acquisition, soil and groundwater assessment may be warranted at that time to address the recognized environmental conditions identified during this investigation.

The remainder of this report is organized as follows: Section 2 describes the scope of work and limitations for this report; Section 3 presents a site description; Section 4 presents user provided information; Section 5 presents a records review; Section 6 presents a summary of the site reconnaissance; Section 7 presents a summary of interviews; Section 8 presents a summary of AEROSTAR's findings and opinions; Section 9 presents a summary of AEROSTAR's conclusions; Section 10 presents any deviations from the ASTM standard; Section 11 provides additional services conducted as part of this Phase I ESA; Section 12 presents the references; Section 13 presents the signatures of environmental professionals preparing and reviewing the report; and Section 14 presents the qualifications of the environmental professionals participating in this Phase I ESA. Figures are included in Appendix A. Site photographs are included in Appendix B. A computerized regulatory agency database search is included in Appendix C. Historical research documentation is included in Appendix D. Interview documentation is included in Appendix E. A list of references is included in Appendix F. The qualifications and resumes of the environmental professionals performing this investigation are included in Appendix G.

TABLE 1A
SECTION A PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS

Morganza, Louisiana to the Gulf of Mexico
Terrebonne and Lafourche Parishes, Louisiana

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 1/Crosstex Liquids LIG	3-1	29° 38' 33.90" N, 90° 57' 48.82” W	The facility is an off-site RCRA-SQG and AST facility identified in the LDEQ EDMS as containing large volumes of several hazardous materials or petroleum products; soil and groundwater sampling is on-going at the facility.
Site 2/Unnamed Pumping Station	3-1	29° 38' 15.9" N, 90° 57' 44.5" W	One approximate 250-gallon AST was observed at an unnamed pumping station.
Site 3/Residence storing AST	3-1	29° 37' 52" N, 90° 57' 1.4" W	An approximate 250-gallon AST was observed at a residence along an outfall canal associated with existing levee; an abandoned drum was observed in the canal adjacent to the AST.
Site 4/Bob’s Bayou Black Marina	3-1	29° 37' 43.76" N, 90° 56' 40.39" W	Three fuel storage tanks ranging in size from approximately 250 gallons to 1,000 gallons were observed at Bob’s Bayou Black Marina.
Site 5/Petro Quest Energy, LLC	3-1	29° 37' 44.52" N, 90° 56' 43.01” W	Approximately 26 steel and polycarbonate drums were observed at the Petro Quest Energy, LLC facility; three drums were observed buried under heavy brush approximately 100 feet northwest of this facility.
Site 6/North Terrebonne Gas Plant	3-1	29° 37' 46.29" N, 90° 55' 57.27” W	Multiple storage tanks, including three bulk storage tanks approximately 100,000 gallons in size containing crude oil; and several unidentified storage tanks ranging from approximately 500 gallons to 10,000 gallons in size; were observed on the property. Distillation columns, as well as several thousand linear feet of pipeline, were observed at this RCRA-LQG.
Site 7/ Transcontinental Pipeline Company	3-2	29° 36' 8.11" N, 90° 52' 33.88” W	Two high-pressure tanks approximately 5,000 and 10,000 gallons in size, four vertical storage tanks approximately 2,000 gallons in size, and several thousand linear feet of pipeline were observed at this RCRA-CESQG and AST facility; groundwater and soil sampling is on-going based on an existing consent decree against the facility.
Site 8/Daneco Alligator Farm	3-2	29° 34' 54.31" N, 90° 49' 28.34” W	Two 5,000-gallon and two 1,000-gallon ASTs containing Avgas, gas, and diesel are listed for this facility.

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 9/Waterproof Ridge Farm	3-3	29° 32' 46.35" N, 90° 48' 3.81" W	Two approximate 1,000-gallon ASTs were observed resting on bare earth containing unknown product at the facility.
Site 10/Nuisance dumping	3-4	29° 28' 36.1" N, 90° 45' 57.4” W	Nuisance dumping, consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, was observed in the central portion of the segment.
Site 11/Abandoned drums	3-5	29° 27' 42.48" N 90° 45' 49.49" W	Six weathered, empty 55-gallon drums were observed in the vicinity of a proposed culvert with sluice gates in the central portion of the segment.
Site 12/Upper Bayou Dularge Pump Station	3-5	29° 25' 2.76" N 90° 47' 3.56” W	An approximate 250-gallon AST containing unknown product was observed at the facility.
Site 13/Falgout Canal Marina	3-5	29° 24' 47.95" N 90° 47' 1.24" W	Two approximate 1,000-gallon ASTs containing unknown product were observed along the Falgout Canal. The facility operates as a boat launch and fueling facility and has been permitted to operate a waste water treatment system consisting of activated sludge with chlorination.
Site 14/Frogco Amphibious Equipment	3-5	29° 24' 37.70" N, 90° 47' 13.21" W	An unlabeled, approximate 5,000-gallon AST was observed outside the Frogco Amphibious Equipment facility. The AST appeared to be stored on the grass.
On-site Oil and Gas Wells	NA	Multiple Locations	A total of 30 former and present oil and/or gas well locations were identified within Section A. Please refer to Appendix C for the latitude/longitude and additional information about these locations.
Off-site Oil and Gas Wells	NA	Multiple Locations	A total of 36 former and present oil and/or gas well locations were identified within 500 feet of Section A (1,000 feet from the centerline of the alignment). Please refer to Appendix C for the latitude/longitude and additional information about these locations.

TABLE 1B
SECTION B PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS

Morganza, Louisiana to the Gulf of Mexico
Terrebonne and Lafourche Parishes, Louisiana

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 1/Building without signage	3-5	29° 24' 36.41" N 90° 47' 11.46" W	An approximate 5,000-gallon, unlabeled AST was observed under a canopy within secondary containment. No signs identified the facility.
Site 2/Plains All American Pipeline	3-7	29° 17' 54.89" N, 90° 38' 58.85" W	Six ASTs, approximately 300,000 gallons each in size, were observed from the road at this crude oil pipeline transportation facility. The facility is fenced. The facility is listed as a RCRA generator.
Site 3/Shell Pipeline Co. – Lake Barre Booster Station Dock	3-7	29° 17' 56.76" N, 90° 38' 55.55" W	An approximate 5,000-galllon AST was observed from the road at this booster station. Two 55-gallon drums, labeled heavy engine oil and oil, were observed at the entrance to this facility. The AST was stored on a low concrete surface.
Site 4/Cecil Lapeyrouse Grocery	3-7	29° 18' 27.36" N, 90° 38' 50.55" W	One approximate 1,500-gallon AST, labeled diesel, and two approximate 5,000-gallon ASTs, labeled unleaded gasoline was observed. The tanks were stored on a gravel parking lot without secondary containment.
Site 5/Building without signage	3-7	29° 18' 37.93" N, 90° 38' 48.86" W	An approximate 1,500-gallon, unlabeled, rusted AST was observed from the road. No signs identified the facility.
Site 6/Building without signage	3-7	29° 19' 30.68" N, 90° 38' 38.38" W	An approximate 2,000-gallon, unlabeled AST was observed from the road. No signs identified the facility.
Site 7/Lapeyrouse Seafood Bar and Grocery	3-7	29° 19' 58.90" N, 90° 38' 35.26" W	An approximate 7,500-gallon, unlabeled, AST was observed inside a concrete vault at the edge of a canal.
Site 8/Sportsman's Paradise	3-7	29° 20' 12.86" N, 90° 38' 20.44" W	An approximate 1,500-gallon, unlabeled AST was observed from the road. The AST was stored on a small area of concrete, surrounded by bare ground.
Site 9/Building without signage	3-7	29° 21' 12.07" N, 90° 37' 33.94" W	Two unlabeled ASTs, approximately 1,000 and 5,000 gallons in size, were observed from the road. No signs identified the facility.

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 10/Madison Seafood (closed)	3-8	29° 23' 25.70" N, 90° 35' 13.59" W	Three ASTs, labeled diesel and unleaded gasoline, approximately 20,000 gallons each in size, and one approximate 500-gallon, unlabeled AST were observed from the road. The larger ASTs were stored on a wooden platform adjoining Bayou Terrebonne.
Site 11/Castex Energy, Inc.	3-8	29° 23' 46.92" N, 90° 35' 09.72" W	Four, unlabeled, approximate 7,500-gallon ASTs were observed from the road behind a locked fence. The ASTs appeared to be stored on concrete.
Site 12/Dumped Debris	3-8	29° 23' 59.69" N, 90° 35' 01.39" W	Discarded debris was observed in the marsh along State Highway 55.
Site 13/Discarded five-gallon containers	3-8	29° 24' 09.36" N, 90° 34' 55.43" W	Numerous, discarded five-gallon hydraulic oil and engine oil containers were observed in the marsh along State Highway 55. The containers were stored on bare ground and on a wooden dock.
Site 14/Madison Pump Station	3-8	29° 24' 19.30" N, 90° 34' 29.38" W	An approximate 2,000-gallon AST was observed by helicopter on the levee next to Bayou Terrebonne at the Madison Pump Station. The AST appeared to be stored on a support structure.
Site 15/Marked petroleum pipeline	3-9	29° 25' 30.07" N, 90° 34' 01.75" W	Marked, buried petroleum pipeline right-of-way was observed crossing State Highway 55.
Site 16/Little Caillou Packing Company	3-7	29° 18' 28.29" N, 90° 38' 49.44" W	This facility was identified in the database report as an ERNS facility, located at 7241 Shoreline Drive. A 600-gallon petroleum product discharge from a portable tank discharge line was reported at this facility on December 14, 1995. No additional information was available about this incident.
Site 17/Unnamed facility	3-7	29° 20' 19.15" N, 90° 38’ 13.71" W	This unnamed facility was identified in the database report as an ERNS facility, located at 6809 Highway 56. A transformer oil leak was reported at this address. No additional information was available about the incident.

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 18/Falgout Road Dump	3-6	unknown	A dump site previously was identified along Falgout Canal Road in a September 1997 *Final Report for HTRW Investigations* that covered portions of the corridor. While the exact location of the dump site was not noted in the report, it was notated on a small scale map and appears to have been located within Reaches E-1 or E-2. At the time of the 1997 assessment, the dump consisted of automobile tires, metal and wood construction debris, six, unlabeled, empty 55-gallon drums, several, empty five-gallon containers, and some areas of distressed vegetation and stained soil. AEROSTAR did not locate this dump during the current site investigation.
Site 19/Castex Energy Inc., Lapeyrouse Commingling Facility	3-7	29° 20' 08.58" N, 90° 38' 29.07" W	At least five ASTs were observed from the road for this facility. Each AST was approximately 50,000 gallons in size. No secondary containment structures were observed.
Oil/Gas Wells	NA	Multiple locations	A total of 17 former and present oil and/or gas well locations were identified within the Section B segment. A total of 19 pipeline permits were identified within the Section B segment. Please refer to Appendix C for the latitude/longitude and additional information about these locations.
Oil/Gas Wells	NA	Multiple locations	A total of 19 former and present oil and/or gas well locations were identified within 500 feet of the Section B segment. Please refer to Appendix C for the latitude/longitude and additional information about these locations.
Gas Pipelines	NA	Multiple Locations	A total of 19 pipeline permits identified within the Section B segment (500 feet from the centerline of the alignment). Please refer to Appendix C for additional information about these locations.

TABLE 1C
SECTION C PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS

Morganza, Louisiana to the Gulf of Mexico
Terrebonne and Lafourche Parishes, Louisiana

SITE NUMBER/ FACILITY NAME	FIGURE	LAT/ LONG	OBSERVATIONS
Site 1/Abandoned AST	3-9	29° 25' 20.64" N 90° 26' 47.76" W	An approximate 1,500-gallon, abandoned AST was observed along the levee, within Reach K.
Site 2/Discarded Drum	3-9	29° 25' 53.76" N 90° 27' 39.60" W	An unlabeled 55-gallon poly-drum was observed in the drainage canal near Island Road.
Site 3/Pointe aux Chenes Pump Station	3-9	29° 25' 59.17" N 90° 27' 38.54" W	An approximate 2,000 gallon diesel AST was observed outside a drainage canal pump station. Secondary containment was observed.
Site 4/Northern Pump Station	3-9	29° 25' 29.27" N 90° 27' 15.17" W	An approximate 500 gallon diesel AST was observed outside a drainage canal pump station. Secondary containment was observed.
Site 5/Seafood Company ASTs	3-9	29° 25' 41.91" N 90° 27' 21.94" W	Two ASTs, approximately 10,000 gallons each in size, were observed outside a commercial seafood company, along State Highway 665 and Bayou Pointe aux Chenes. Secondary containment was observed.
Site 6/Lafourche Levee Pump Station	3-10	29° 30' 55.10" N 90° 22' 30.86" W	Three diesel ASTs, approximately 500 gallons, 1,000 gallons, and a 2,000 gallons in size, were observed outside a drainage canal pump station. No secondary containment was observed.
Site 7/Pointe Aux Chene Marina	3-9	29° 24' 59.60" N 90° 26' 51.62" W	Three diesel ASTs, approximately 1,000 gallon and two 2,000 gallon in size, were observed in the Pointe Aux Chene Marina.
Site 8/North-South Petroleum Pipeline	NA	29° 25' 56.46" N 90° 27' 40.24" W	A petroleum pipeline was observed extending northwest to southeast.
Oil/Gas Wells	NA	Multiple locations	A total of 14 former and present oil and/or gas well locations were identified within the Section C segment. Please refer to Appendix C for the latitude/longitude and additional information about these locations.
Oil/Gas Wells	NA	Multiple locations	A total of 19 former and present oil and/or gas well locations were identified within 500 feet of the Section C segment. Please refer to Appendix C for the latitude/longitude and additional information about these locations.
Gas Pipelines	NA	Multiple locations	On-site concerns were noted from 15 pipeline permits identified within the Section C segment (500 feet from the centerline of the alignment). Please refer to Appendix C for additional information about these locations

2.0 INTRODUCTION

2.1 Purpose

The purpose of this Phase I ESA is to identify, to the extent feasible pursuant to ASTM Standard E 1527-05, recognized environmental conditions in connection with the site. The term recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions.

Although performance of this investigation in a manner that is generally consistent with the ASTM Standard E 1527-05 Standard is of benefit, it should be recognized that the Standard of "All Appropriate Inquiry" or "good commercial or customary practice" can only be made on a case-by-case basis and is subject to judicial interpretation.

2.2 Scope of Work

This Phase I ESA was conducted in general accordance with ASTM Standard E 1527-05, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." The assessment consisted of four components: records review, site reconnaissance, interviews, and report preparation.

The scope of work does not include an evaluation of asbestos containing building materials, lead based paint, lead in drinking water, regulatory compliance, soil or groundwater sampling and analysis, cultural and historical resources, industrial hygiene, health and safety, ecological resources, indoor air quality, radon, site geotechnics (soils, foundations, site retention, etc.), wetlands, endangered species, or construction materials testing. AEROSTAR can provide these additional services, if requested.

2.2.1 Records Review

Historical Research: Sources such as historical aerial photographs, city directories, and fire insurance maps were reviewed, if reasonably ascertainable, to evaluate the historical usage of the site and surrounding properties. Additionally, a chain-of-title and an environmental lien search were reviewed if provided by the User.

Physical Setting Sources: Various maps, reports, and technical publications were reviewed and observations of site conditions were made to evaluate the hydrogeological/geological conditions associated with the site and surrounding properties. This data can provide pertinent information about the site, including soil classification, surface water flow directions, and possibly, an indication of the local directions of surficial aquifer groundwater flow.

Environmental Public Records Review: Reasonably ascertainable local, state, tribal and federal environmental records and the regulatory database search were reviewed to help assess the likelihood of problems from migrating hazardous substance or petroleum products. Public records identifying these facilities can provide indications of the potential for recognized environmental conditions to be present at the site.

AEROSTAR obtained, reviewed and evaluated reasonably ascertainable information from the Client, User, site owner; local, state, tribal, or federal entities; and the environmental regulatory database search. The conclusions and recommendations of this report are based, in part, on this information. The data reviewed during this investigation appeared to be accurate; however, the provided services do not include the verification of the accuracy or authenticity of information provided by others.

2.2.2 Site Reconnaissance

On-Site Reconnaissance: Visual and physical inspections conducted as part of this investigation included walking the entire length of the corridor and visually observing the site from the current levee right-of-way. Additionally, observations of access to and egress from the site were noted, as well as the presence and condition of any on-site buildings, utilities, or other improvements. During the site inspection, an emphasis was placed on observing the operations or conditions exhibiting the potential for recognized environmental conditions. All phases of the site reconnaissance were documented and photographs were taken.

Off-Site Reconnaissance: Off-site reconnaissance conducted as part of this investigation included visual and physical inspections of the adjoining properties from the site boundary and from publicly accessible areas. Additionally, a vehicular reconnaissance of the surrounding properties was conducted. During these inspections, an emphasis was placed on observing the operations or conditions exhibiting the potential for recognized environmental conditions. If any sources were identified, the inspector would document the name and location of the facility.

2.2.3 Interviews

AEROSTAR conducted interviews with available individuals familiar with the site, as well as local, state, tribal or federal agency representatives, regarding issues which could have an adverse effect on the environmental status of the subject site. Site owners and site occupants were not interviewed as part of this investigation.

AEROSTAR depends on the Client, tenant, and other site personnel to provide data pertinent to determining the environmental status of the site, which may or may not exist within public records. Site owners and site occupants were not interviewed as part of this investigation. The conclusions and recommendations of this report are based, in part, on available public information. The data obtained during this investigation appeared to be accurate; however, the provided services do not include the verification of the accuracy or authenticity of information provided by others.

2.2.4 Report Preparation

This report was prepared based upon the information provided by the Client and the User, the observations made during the site reconnaissance, and the information obtained from a review of readily available records. Given the inherent limitations of environmental assessment work, AEROSTAR will not guarantee that any site is free of hazardous or potentially hazardous materials or that latent or undiscovered conditions will not become evident in the future. This report was prepared within the professional conduct of the industry and in accordance with the proposal and the standard terms and conditions presented in the contract. No other warranties, representations or certifications are made.

2.3 Limitations

AEROSTAR has prepared this assessment for the Client and User. AEROSTAR's assessment represents a review of certain information relating to the site that was obtained by methods described above and does not include sampling or other monitoring activities at the property. While AEROSTAR has used reasonable care to avoid reliance upon data and information that is inaccurate, AEROSTAR is not able to verify the accuracy or completeness of all data and information available during the investigation. Some of the conclusions in this report would be different if the information upon which they are based is determined to be false, inaccurate or incomplete.

AEROSTAR makes no legal representations whatsoever concerning any matter including, but not limited to, ownership of any property or the interpretation of any law. AEROSTAR further disclaims any obligations to update the report for events taking place after the time during which the assessment was conducted.

This report is not a comprehensive site characterization and should not be construed as such. The opinions presented in this report are based upon the findings derived from a site reconnaissance, a limited review of specified regulatory records and historical sources, and comments made by the interviewees.

Phase I ESAs, by their very nature, are limited. AEROSTAR has endeavored to meet what it believes is the applicable standard of care, and, in doing so, is obliged to advise the Client and User of Phase I ESA limitations. AEROSTAR believes that providing information about limitations is essential to help the Client and User identify and thereby manage its risks. Through additional research, these risks can be mitigated - but they cannot be eliminated. AEROSTAR will, upon request, advise the Client and User of the additional research opportunities available, their impact, and their cost.

As noted above, the Phase I ESA was conducted at the referenced site, and this report was prepared for the sole use of the Client and User. This report shall not be relied upon by or transferred to any other party without the express written authorization of AEROSTAR.

Along with all of the limitations set forth in various sections of the ASTM Standard E 1527-05 protocol, the accuracy and completeness of this report is necessarily limited by the following:

- At the request of the client, a chain-of-title and environmental lien search were not conducted.
- At the request of the client, AEROSTAR did not conduct interviews with the owner or operators at the sites along the corridor.
- At the request of the client, historical city directories were not researched for this investigation
- AEROSTAR was unable to gain access to the interior of the site buildings during the site inspection.

2.3.1 Data Gaps

Data gaps are the lack or inability to obtain information required by ASTM Standard E 1527-05 despite good faith efforts to gather such information, such as, but not limited to, the inability to conduct a site visit, inability to conduct interviews, and the inability to establish historical uses of the site or surrounding properties. Not all data gaps are significant, and a data gap will only be discussed in this section if: 1) a data gap occurs during investigation, and 2) the data gap impairs AEROSTAR's ability to meet the objectives of ASTM Standard E 1527-05.

Historical Data Source Failures: Aerial photographs were not available for review prior to 1940. Sanborn Fire Insurance Maps did not cover the site vicinity. The historical records researched did not allow the property's history to be traced back to 1940 or to the property's first developed use, whichever came first, which constitutes historical data failure per ASTM Standard E 1527-05 § 8.3.2.3.

The following significant data gaps were noted: site owners and site occupants were not interviewed; and an environmental lien search was not performed for the site.

No other apparent significant data gaps were noted during the investigation of the site.

2.4 Special Terms and Conditions

This report, and the information contained herein, shall be the sole property of AEROSTAR until payment of any unpaid balance is made in full. The Client and User agree that until payment is made in full, the Client and User shall not have a proprietary interest in this report or the information contained herein. AEROSTAR shall have the absolute right to request the return of any and all copies of this report submitted to other parties, public or private, on behalf of the Client and User in the event of nonpayment of outstanding fees by the Client pursuant to AEROSTAR's proposal.

2.5 User Reliance

This report is intended for the sole use of Client and User. Its contents may not be relied upon by other parties without the explicit written consent of AEROSTAR. This is not a statement of suitability of the property for any use or purpose.

3.0 SITE DESCRIPTION

3.1 Section A

3.1.1 Location

Section A consists of an approximate 30.8-mile corridor of the existing levee and undeveloped land located in Gibson, Waterproof and Theriot, Terrebonne Parish, Louisiana, as shown in Appendix A, Figure 1 (Street Site Location Map). The subject corridor is 1,000 feet wide (500 feet on each side of the proposed alignment). Section A is referenced in the following USGS topographic quadrangles: “Gibson, Louisiana,” dated 1998, “Bayou Cocodrie, Lousiana,” dated 1980, “Humphreys, Louisiana,” dated 1998, and “Lake Theriot, Louisiana,” dated 1994, presented in Appendix A, Figures 2-1 and 2-2 (Topographic Site Location Map). Please also refer to the Site Plans presented in Appendix A, Figures 3-1 through 3-5.

3.1.2 Site and Vicinity General Characteristics

At the time of our investigation, Section A consisted of an approximate 30.8-mile corridor developed with two marinas, the existing levee, two oil and gas fields, two oil and gas facilities, and a pump station located in the southern portion of the segment. The immediate vicinity surrounding the segment is primarily characterized by commercial-industrial, rural-residential and agricultural properties to the east and undeveloped wetlands to the west. Please refer to the Street Site Location Map in Figure 1, the Topographic Site Location Map in Figure 2-1 and 2-2, and the Site Plans in Figures 3-1 through 3-5 for additional details.

3.1.3 Current Use(s) of the Site

Section A consists of commercial-industrial land and wetlands with an existing levee, a public marina, two industrial facilities, two oil and gas fields, and the Daneco Alligator Farm in the northern and central portion of the segment; and primarily agricultural land and wetlands, a pump station, and the Falgout Canal Marina located in the southern portion of the segment. The GIWW, used as a navigable waterway for shipping and commerce, intersects the site in the central portion of the segment with the Mandalay National Wildlife Refuge located north of the GIWW. During the site inspection, there was evidence of the use, storage, disposal, and generation of hazardous substances and petroleum products along the corridor, specifically at the North Terrebonne Gas Plant, the Transcontinental Pipeline Company – Williams Facility, the Waterproof Ridge Farm., the the Falgout Canal Marina, and the Upper Bayou Dularge Pump Station. Petroleum products and hazardous materials were observed primarily in various-sized ASTs and 55-gallon drums. Observations made during the site reconnaissance are further discussed in Section 6 of this report.

3.1.4 Structures, Roads, and Other Improvements on the Site

3.1.4.1 Existing Structures

Section A is developed with Bob’s Bayou Black Marina, the North Terrebonne Gas Plant, the Transcontinental Pipeline Company – Williams Facility, the Daneco Alligator Farm and the Waterproof Ridge Farm in the northern portion. The Falgout Canal Marina and associated camps and the Upper Bayou Dularge Pump Station are developed in the southern portion of the segment.

3.1.4.2 Existing Roads

US Highway 90 is located at the northern terminus of the Barrier Plan alignment. Old Spanish Trail (Parish Road 11) and Geraldine Road intersect the Barrier Plan alignment in the northern portion of the segment. Bayou Black Road (Parish Road 182) is located approximately 1,000 feet east along the Barrier Plan alignment. Vega Court, Marina Drive, Shell E and P Road, and Daneco Court terminate or are located within the Barrier Plan alignment. Bayou Black Road (Parish Road 182) is located approximately 1,000 feet north of Section A. Gabi Court and Dr. Beatrous Road (Parish Road 59) are located within Section A of the alignment. Brady Drive (Parish Road 111) and Bayou Dularge Road (LA Highway 315) intersect Section A in the southern portion of the alignment.

3.1.4.3 Heating/Cooling System

Heat is provided to the vicinity by natural gas and electrical heating units, and cooling is provided by electrically powered central and window air conditioning units.

3.1.4.4 Utilities (including Sewage Disposal)

In the vicinity of Section A, electricity is provided by Entergy and the South Louisiana Electric Cooperative Association; natural gas is provided by the Terrebonne Parish Consolidated Government and Atmos Energy; and sanitary sewer is provided by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

3.1.4.5 Potable Water

Potable water is provided to the area of Section A by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

3.1.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties are as follows:

Table 2A-1
Description of Adjoining Parcels – Section A, Barrier Plan

Direction From Site	Address	Description of Current Use
Northwest	NA	US Highway 90 followed by undeveloped land
Northeast	Bayou Black Road 5609 Bayou Black Drive	Commercial-industrial and rural-residential property Crosstex LIG Liquids – Gibson Gas Plant
Southeast	NA	Reach A
Southwest	NA	Undeveloped wetlands Gibson Oil and Gas Field Orange Grove Oil and Gas Field

Table 2A-2
Description of Adjoining Parcels – Section A, Reach A

Direction From Site	Address	Description of Current Use
North	NA	Barrier Plan alignment
East	NA	Agricultural and rural-residential property Sunrise Oil and Gas Field
South	NA	Reach B

West	NA	Undeveloped wetlands Sunrise Oil and Gas Field

Table 2A-3
Description of Adjoining Parcels – Section A, Reach B

Direction From Site	Address	Description of Current Use
North	NA	Reach A
East	NA	Agricultural and rural-residential property
South	NA	Undeveloped wetland
West	NA	Undeveloped wetland

Based on the information reviewed as part of this assessment, the current uses of adjoining properties are not suspected of having the potential to negatively impact the site, except the Crosstex LIG Liquids – Gibson Gas Plant facility and wellpoints associated with the Orange Grove Oil and Gas Field.

3.2 Section B

3.2.1 Location

Section B consists of an approximate 28-mile corridor located in Dulac, Chauvin, and Montegut, in Terrebonne Parish, Louisiana, and is shown in Appendix A, Figure 1 (Street Site Location Map). The entire subject corridor is 1,000 feet wide (500 feet on each side of the proposed alignment). Section B is referenced in the following USGS topographic quadrangles: "Lake Theriot, Louisiana," dated 1998, "Dulac, Louisiana," dated 1994, "Lake Quitman, Louisiana," dated 1994, "Lake Tambour, Louisiana," dated 1994, and "Montegut, Louisiana," dated 1994, presented in Appendix A, Figure 2-3 (Topographic Site Location Map). Please also refer to the Site Plans presented in Appendix A, Figures 3-6 through 3-8.

3.2.2 Site and Vicinity General Characteristics

At the time of our investigation, Section B consisted of an approximate 28-mile segment with Bayou Dularge, Bayou Dularge Road and Brady Road at the western terminus of the segment and Humble Canal and Humble Canal Road at the eastern terminus of the segment. The Section B segment consists of undeveloped land, wetlands, existing levee and roadways, residential and commercial properties, crude oil pipeline transportation facilities, a crude oil pipeline booster station, natural and petroleum pipeline right-of-ways, the Bayou Terrebonne Floodgate, the Madison Pump Station, and a Native American mound and cemetery. The immediate vicinity surrounding Section B is primarily characterized by undeveloped land, wetlands, and residential and commercial properties. Please refer to the Street Site Location Map in Figure 1, the Topographic Site Location Map in Figure 2-3, and the Site Plans in Figures 3-6 through 3-8 for additional details.

3.2.3 Current Uses(s) of the Site

Section B consists of undeveloped land, wetlands, existing levee and roadways, residential and commercial properties, crude oil pipeline transportation facilities, a crude oil pipeline booster station, natural and petroleum pipeline right-of-ways, Bayou Terrebonne Floodgate, The Madison Pump Station, Falgout Canal Bridge, FAA Air Traffic Control facility, and a Native American mound and cemetery. Dump trucks and heavy machinery were observed on the levee within Reach I-1, apparently conducting earth-moving activities. During the site inspection, there was evidence of the use, storage, and transportation of petroleum products along the segment. Petroleum products were observed primarily in various-sized ASTs, pipelines, five-gallon containers and 55-gallon drums. Observations made during the site reconnaissance are further discussed in Section 6 of this report.

3.2.4 Structures, Roads, and Other Improvements on the Site

3.2.4.1 Existing Structures

Structures along Section B consist of residential and commercial structures, Falgout Canal Bridge, Bayou Terrebonne Floodgate, Madison Pump Station, buried natural gas and petroleum pipelines, the FAA Air Traffic Control facility, Plains All American Pipeline crude oil transportation facility, Shell Pipeline Co., LP – Lake Barre Booster Station dock facility, and a small Castex Energy booster station facility.

3.2.4.2 Existing Roads

Falgout Canal Road (Parrish Road 10), Brady Road, and Bayou Dularge Road (State Highway 315) are located in Reach E-2. Falgout Canal Road is located in Reach E-1. Four Point Road is located in Reach G-2 and Alternate Alignment 1. Bayou Sale Road (State Highway 57) is located in Reaches G-2, G-3 and H-1. Little Caillou Road (State Highway 56) is located in Reaches H-1, H-2, and H-3. Montegut Road (State Highway 55) is located in Reaches I-1, I-2 and I-3. Pointe Barre Road is located in Reach I-3. Humble Canal Road is located in Reach I-3. Shoreline Drive and Touloulou Street, located east of Little Caillou Road, and other smaller roads, are located in Reaches H-2 and H-3. Madison Canal Road is located in Reach I-2.

3.2.4.3 Heating/Cooling System

Heat is provided to the strutures in the subject site area by natural gas and electrical heating units, and cooling is provided by electrically powered central and window air conditioning units.

3.2.4.4 Utilities (including Sewage Disposal)

Sewage disposal is supplied to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish; electricity is supplied by the South Louisiana Electric Cooperative Association. Additionally, natural gas is provided through the area by South Coast, Atmos Energy and Terrebonne Parish Consolidated Government.

3.2.4.5 Potable Water

Potable water is provided to the area of Section B by the Consolidated Waterworks District 1 of Terrebonne Parish.

3.2.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties are as follows:

Table 2B-1
Description of Adjoining Parcels – Section B, Reaches E-1 and E2

Direction From Site	Address	Description of Current Use
North	NA NA Janet Lynn Drive Janet Lynn Drive	Residential property Undeveloped land and wetlands Boat Storage facility Frogco Amphibious Equipment warehouse

East	NA NA	Undeveloped land Houma Navigational Canal
South	NA	Wetlands
West	NA	Undeveloped land

Table 2B-2
Description of Adjoining Parcels – Section B, Reaches F-1 and F-2

Direction From Site	Address	Description of Current Use
North	NA NA	Undeveloped land and wetlands Falgout Canal
East	NA Shrimpers Row Shrimpers Row, Trosclair Lane	Houma Navigational Canal Residential property Commercial property
South	NA	Wetlands
West	NA	Wetlands

Table 2B-3
Description of Adjoining Parcels – Section B, Reaches G-1, G-2 and G-3

Direction From Site	Address	Description of Current Use
North	NA Four Point Road	Undeveloped land and wetlands Residential land
East	NA	Undeveloped land and wetlands
South	NA	Undeveloped land and wetlands Bayou Sale Road (State Highway 55)
West	NA	Undeveloped land and wetlands

Table 2B-4
Description of Adjoining Parcels – Section B, Alternate Alignment 1

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped land and wetlands Four Point Road
East	NA	Undeveloped land and wetlands Bayou Sale Road (State Highway 55)
South	NA	Undeveloped land and wetlands Four Point Road
West	NA	Undeveloped land and wetlands

Table 2B-5
Description of Adjoining Parcels – Section B, Alternate Alignment 2

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped land and wetlands
East	NA	Undeveloped land and wetlands Bayou Sale Road (State Highway 55)
South	NA	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Table 2B-6
Description of Adjoining Parcels – Section B, Reach H-1

Direction From Site	Address	Description of Current Use
North	NA Little Caillou Road	Undeveloped land and wetlands Residential land Little Caillou Road (State Highway 56) Bayou Sale Road (State Highway 55)
East	NA	Undeveloped land and wetlands
South	NA 7394 State Highway 56	Undeveloped land and wetlands Portion of Plains All American Pipeline facility
West	NA	Undeveloped land and wetlands

Table 2B-7
Description of Adjoining Parcels – Section B, Reach H-2

Direction From Site	Address	Description of Current Use
North	NA Little Caillou Road	Undeveloped land and wetlands Residential land Little Caillou Road (State Highway 56) Bayou Sale Road (State Highway 55)
East	NA	Undeveloped land and wetlands
South	NA 7394 State Highway 56	Undeveloped land and wetlands Portion of Plains All American Pipeline facility
West	7394 State Highway 56 State Highway 56 (Little Caillou Rd.)	Portion of Plains All American Pipeline facility Residential and commercial properties, campground

Table 2B-8
Description of Adjoining Parcels – Section B, Reach H-3

Direction From Site	Address	Description of Current Use
North	NA NA	Undeveloped land and wetlands Montegut Road (State Highway 55)
East	NA	Undeveloped land and wetlands
South	NA Little Caillou Road	Undeveloped land and wetlands Residential and commercial properties, Lapeyrouse Campground
West	Little Caillou Road Little Caillou Road NA 6858 State Highway 56	Residential and commercial properties, Lapeyrouse campground; La Butte Native American Mound and cemetery Undeveloped land and wetlands Castex Energy, Lapeyrouse Commingling Facility

Table 2B-9
Description of Adjoining Parcels – Section B, Reach I-1

Direction From Site	Address	Description of Current Use
North	NA NA NA	Undeveloped land and wetlands Residential land Bayou Terrebonne Floodgate

East	Montegut Road (State Highway 55)	Undeveloped land and wetlands Residential land
South	NA	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Table 2B-10
Description of Adjoining Parcels – Section B, Reach I-2

Direction From Site	Address	Description of Current Use
North	NA Montegut Road	Undeveloped land and wetlands Residential land
East	NA	Undeveloped land and wetlands
South	NA NA Montegut Road	Undeveloped land and wetlands Bayou Terrebonne Floodgate Residential land
West	NA Montegut Road	Undeveloped land and wetlands Residential land

Table 2B-11
Description of Adjoining Parcels – Section B, Reach I-3

Direction From Site	Address	Description of Current Use
North	NA Montegut Road	Undeveloped land and wetlands Residential land
East	NA	Undeveloped land and wetlands
South	NA Montegut Road	Undeveloped land and wetlands Residential land
West	NA Montegut Road Montegut Road Montegut Road	Undeveloped land and wetlands Residential land Volunteer fire station Montegut Community Center

Based on the information reviewed as part of this assessment, the current uses of adjoining properties are not suspected of having the potential to negatively impact the site, except for the Castex Energy, Inc., Lapeyrouse Commingling Facility, located at 6848 State Highway 56 (Little Caillou Road), adjoining Reach H-3 to the north.

3.3 Section C

3.3.1 Location

Section C consists of an approximate 21-mile segment located in Cut Off and Montegut, within Lafourche and Terrebonne Parishes, Louisiana, and is shown in Appendix A, Figure 1 (Street Site Location Map). The entire subject corridor is 1,000 feet wide (500 feet on each side of the proposed alignment). Section C is referenced in the following USGS topographic quadrangles: "Cut Off, Louisiana," dated 1998, "Lake Bully Camp, Louisiana," dated 1994, "Larose, Louisiana," dated 1998, and "Montegut, Louisiana," dated 1994, presented in Appendix A, Figure 2-4 (Topographic Site Location Map). Please also refer to the Site Plans presented in Appendix A, Figures 3-9 and 3-10.

3.3.2 Site and Vicinity General Characteristics

At the time of our investigation, Section C consisted of an approximate 21-mile segment consisting of undeveloped land, wetlands, existing levee and roadways, residential and commercial properties, and natural gas and petroleum pipeline right-of-ways. The immediate vicinity surrounding Section C is primarily characterized by undeveloped land, wetlands, pump and residential and commercial properties. Please refer to the Street Site Location Map in Figure 1, the Topographic Site Location Map in Figure 2-4, and the Site Plans in Figures 3-9 and 3-10 for additional details.

3.3.3 Current Use(s) of the Site

Section C consists of undeveloped land, wetlands, existing levee and roadways, natural gas and petroleum pipeline right-of-ways, three pump stations, a marina, and residential and commercial properties. Observations made during the site reconnaissance are further discussed in Section 6 of this report.

3.3.4 Structures, Roads, and Other Improvements on the Site

3.3.4.1 Existing Structures

Existing structures along Section C consist of residential and commercial structures, buried natural gas and petroleum pipelines, pump stations, and the Pointe Aux Chene Marina.

3.3.4.2 Existing Roads

Montegut Road (State Highway 55) and Humble Canal Road are located in Reach J-2. Pointe Aux Chene Road (State Highway 665) is located in Reaches J-2, J-1, J-3, and K. Island Road is located between Reaches J-1 and J-3.

3.3.4.3 Heating/Cooling System

Heat is provided to the strutures in the subject site area by natural gas and electrical heating units, and cooling is provided by electrically powered central and window air conditioning units.

3.3.4.4 Utilities (including Sewage Disposal)

In the vicinity of Section C, electricity is provided by South Louisiana Electric Cooperative Association and Entergy; natural gas is provided by Atmos Energy and South Coast Gas; and sanitary sewer is provided by the Consolidated Waterworks District No. 1 of Terrebonne Parish and Lafourche Parish Water District 1.

3.3.4.5 Potable Water

Potable water is provided to the area of Section C by the Consolidated Waterworks District No. 1 of Terrebonne Parish and Lafourche Parish Water District 1.

3.3.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties are as follows:

Table 2C-1
Description of Adjoining Parcels – Section C, Reach J-2

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped and wetlands
East	State Highway 665	Residential property
South	NA	Undeveloped and wetlands
West	NA	Undeveloped land

Table 2C-2
Description of Adjoining Parcels – Section C, Reach J-1

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped land and wetlands
East	State Highway 665	Residential property
South	Island Road	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Table 2C-3
Description of Adjoining Parcels – Section C, Reach J-3

Direction From Site	Address	Description of Current Use
North	Island Road	Undeveloped land and wetlands
East	State Highway 665	Residential and commercial property; marina
South	NA	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Table 2C-4
Description of Adjoining Parcels – Section C, Reaches K and L

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped land and wetlands
East	NA	Gas platform; Undeveloped land and wetlands
South	NA	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Table 2C-5
Description of Adjoining Parcels – Section C, Reach L-3

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped land and wetlands
East	NA	Undeveloped land and wetlands
South	NA	Undeveloped land and wetlands
West	NA	Undeveloped land and wetlands

Based on the information reviewed as part of this assessment, the current uses of adjoining properties are not suspected of having the potential to negatively impact the site.

4.0 USER PROVIDED INFORMATION

4.1 Title Records

A chain-of-title report for the site was not provided to AEROSTAR by the User or Client.

4.2 Environmental Liens or Activity and Use Limitations

Due to the number of parcels associated with the site, the Client did not request an environmental lien search.

4.3 Specialized Knowledge

No information was provided to AEROSTAR by the User with respect to any specialized knowledge or experience that may pertain to recognized environmental conditions in connection with the site.

4.4 Commonly Known or Reasonably Ascertainable Information

The User was not aware of any commonly known or reasonably ascertainable information about the site that would indicate the presence of recognized environmental conditions associated with the property.

4.5 Valuation Reduction for Environmental Issues

The User indicated the purchase or sale price reflected the fair market value of the site.

4.6 Owner, Property Manager, and Occupant Information

The properties associated with the site are owned, managed, and occupied by numerous individual and businesses. Specific information concerning individual site owners and occupants is not provided at the request of the Client.

4.7 Reason for Performing Phase I ESA

The purpose of this ESA was to complete an assessment in a good commercial and customary fashion at the property with respect to the range of hazardous substance, pollutants, or contaminants within the scope of the CERCLA, as well as for petroleum product contaminants. The ESA has been completed to determine the potential for contamination by means of appropriate inquiries into previous ownership and into uses of the property consistent with good commercial or customary practices. It is in compliance with the requirements for conducting “All Appropriate Inquiry” under EPA rule with the exception of conducting an environmental lien search and interviews of applicable parties.

4.8 Other

AEROSTAR reviewed the *Environmental Data for Hazardous, Toxic, and Radioactive Waste (HTRW) Investigations – Morganza, Louisiana, to the Gulf of Mexico Hurricane Protection Levees and Associated Project Features* report dated September 1997 prepared by Gulf Engineers and Consultants as part of this Phase I ESA investigation. The report investigated two alignments that deviate from the currently proposed alignment in some regions of the project corridor, most notably in Section A around the undeveloped portion in the area of the GIWW, in Section B east of the Houma Navigational Canal, and in Section C in the western portion of that segment also known as USACE Reach J-1. The report identified eighteen potential HTRW features that could be sources of significant contamination within the corridor; however, no further investigation was recommended.

AEROSTAR reviewed the *Initial Hazardous, Toxic, and Radioactive Waste (HTRW) Assessment – Morganza to the Gulf of Mexico Hurricane Protection Levees Reach J-1* report dated April 2005 prepared by the USACE as part of this Phase I ESA investigation. The assessment identified a low risk of encountering HTRW at Reach J-1.

A USACE Project Feature Map, provided by the Client, was used as a reference map for the reaches and other project features, provided as Appendix E.

5.0 RECORDS REVIEW

5.1 Standard Environmental Record Sources

As a part of this assessment, AEROSTAR reviewed information sources to obtain existing information pertaining to a release of hazardous substances or petroleum products on or near the site. AEROSTAR obtained an ASTM regulatory database search through FTC. A copy of the database report is included in Appendix C. AEROSTAR also reviewed other available standard environmental record sources at the LDEQ, as needed. Table 3 presents the summary of the regulatory database report.

TABLE 3
Regulatory Database Summary

Source	Applicable Search Distance	Section A			Section B			Section C		
		S[1]	A[2]	ASTM[3]	S[1]	A[2]	ASTM[3]	S[1]	A[2]	ASTM[3]
Federal NPL Site	1.0 mile	0	0	0	0	0	0	0	0	0
Federal Delisted NPL	0.5 mile	0	0	0	0	0	0	0	0	0
Federal CERCLIS List	0.5 mile	0	0	0	0	0	0	0	0	0
Federal CERCLIS NFRAP Site List	0.5 mile	0	0	0	0	0	0	0	0	0
Federal RCRA CORRACTS and TSD Facilities	1.0 mile	0	0	0	0	0	0	0	0	0
Federal RCRA Non-CORRACTS TSD Facilities	0.5 mile	0	0	0	0	0	0	0	0	0
Federal RCRA Generators Lists	S[1] & AP[2]	1	0	0	1	0	0	0	0	0
Federal IC/EC Registries	S[1]	0	0	0	0	0	0	0	0	0
Federal ERNS	S[1]	0	0	0	2	0	0	0	0	0
State- and Tribal-equivalent NPL Sites	1.0 mile	0	0	0	0	0	0	0	0	0
State- and Tribal-equivalent CERCLIS Sites	0.5 mile	0	0	0	0	0	0	0	0	0
State and Tribal Landfill and/or Solid Waste Disposal Site Lists	0.5 mile	0	0	0	0	0	0	0	0	0
State and Tribal LUST Lists	0.5 mile	0	0	0	0	0	0	0	0	0
State and Tribal Registered UST Lists	S[1] & AP[2]	0	0	0	0	0	0	0	0	0
State and Tribal IC/EC	S[1]	0	0	0	0	0	0	0	0	0
State and Tribal voluntary cleanup sites	0.5 mile	0	0	0	0	0	0	0	0	0
State and Tribal Brownfield sites	0.5 mile	0	0	0	0	0	0	0	0	0

[1] Site – number of facilities located at the site

[2] Adjoining Property – number of facilities located on an adjoining property

[3] Within the ASTM-specified search distance – number of facilities located within the applicable search distance

The database report for Section A lists one RCRA-GEN facility that is not located within the segment and is not discussed below. Regulatory information reviewed concerning any facilities located within or adjoining the corridor is detailed below.

The database report for Section B lists two additional ERNS facilities that are not located within the segment and are not discussed below. One facility is listed twice with two different EPA ID#s and is discussed below. One facility listed in the database report, “Winter Shall Energy,” was not located based on the limited information provided in the database report and was not listed in the LDEQ database.

Regulatory information reviewed concerning any facilities located within or adjoining the corridor is detailed below.

No facilities were located within the ASTM search distance as listed in the regulatory database report for Section C.

North Terrebonne Gas Plant, 449 Shell E and P Road, Gibson, LA 70356, EPA ID# LAD985197680, AI# 20273, 26875: This RCRA-LQG and AST facility is located within the Barrier Plan alignment of Section A. The facility is used for oil and gas exploration south of the site; several of the wellpoints for this facility are located in the project corridor. Records were obtained for this facility dating back to 1966. According to a RCRA Subtitle C Identification Form for the calendar year 2007, the most recent year reported, the facility did not generate any hazardous waste; however, the facility historically reported generation of the following wastes: D001 – general ignitable waste, D002 – general corrosive waste, D004 - Arsenic, D018 - Benzene, F003 – spent non-halogenated solvents, and F005 – spent non-halogenated solvents. The FTC report lists these wastes including Chromium, Cadmium, and Lead generated at the facility. Information obtained from the LDEQ EDMS lists the following hazardous materials located at the site: storage tanks containing at least 10,000 lbs of cyclohexylamine; 5,000 lbs of ethylene glycol and methanol; 1,000 lbs of diesel, diethanolamine, sodium hydroxide, and sulfuric acid; and several systems containing at least 100 lbs of liquefied petroleum gas, general liquid hydrocarbons, monoethanolamine, petroleum hydrocarbons, sodium hypochlorite, and sodium sulfite. According to documentation obtained from the LDEQ EDMS, the EPA cited the facility for failing to report hazardous waste generation for the facility in April of 2005. Further documentation stated that after Hurricanes Gustav and Ike, a sheen was reportedly observed in floodwaters that inundated the site. During the site investigation, three approximate 100,000 gallon ASTs containing crude oil were observed in the northwest portion of the facility. Thousands of linear feet of aboveground pipeline was observed traversing the site as well as several compressed gas systems. These pipelines are part of the Shell Shoal Oil pipeline system located along the site corridor. Based on information obtained, a leak of approximately 12 barrels of condensate occurred from this pipeline within Section A of the site. The material was removed from the facility; however, no other information regarding this incident was available. Based on the information obtained during this investigation, on-site concerns were noted from this facility.

Plains Pipeline Co. LP – Cocodrie/Plains All American Pipeline, 7394 Highway 56, Chauvin, LA, EPA ID#s LAD985221464/LAR00006676, AI#:158164: This RCRA generator facility is located within Reach H-1 of Section B. Under EPA ID# LAD985221464, the facility is listed as a CE SQG in the database report. Under EPA ID# LAR00006676, the facility is listed as a large quantity generator. The facility operates as pipeline transporter of crude oil, according to the database report. No violations were listed in the database report and none were listed in the LDEQ database. During the site inspection, six ASTs, approximately 300,000 gallons each in size, were observed from the road. No information about the ASTs was available on the LDEQ database. The presence of a crude oil facility within the segment is a concern.

Little Caillou Packing Co., 7241 Shoreline Drive, Chauvin, LA, EPA ID# NA, AI# NA: This ERNS facility is located within Reach H-2 of Section B. According to the database report, 600 gallons of “oil, fuel: No. 2-D” were spilled at the facility from a portable tank because the discharge line developed a leak. The “leak was secured” and sorbents were used to recover materials. The notes indicated that LDEQ would be notified. No information was available from LDEQ about this facility. No ASTs were observed at this facility. Based on the lack of information gathered during this investigation about this incident, on-site concerns were noted from this facility.

No Facility Name, 6809 Highway 56, Chauvin, LA, EPA ID# NA, AI# NA: This ERNS facility is located within Reach H-3 of Section B. According to the database report, an incident report was completed on March 12, 2007. The incident description is as follows: "The caller stated that a transformer started to leak oil onto his property (boat, vehicle, clothes, etc.) and his and his wife's body. The cause of the leak is unknown at this time, but the leak seems to be coming from a seal near the bottom." No other information was listed in the database report. Based on the lack of information gathered during this investigation about this incident, on-site concerns were noted from this facility.

In addition to reviewing the database report, AEROSTAR performed reconnaissance of the site vicinity to identify any sites not mapped by FTC due to inadequate or inaccurate address information and to look for unregistered facilities. Additional petroleum and hazardous material storage facilities were observed within the ASTM search criteria during field reconnaissance performed by AEROSTAR. These facilities were researched on LDEQ's database for information. Facilities queried within Section A included: Waterproof Ridge Farm, Upper Bayou Dularge Pump Station, and Frogco Amphibious Equipment. Facilities queried within Section B included: Cecil Lapeyrouse Grocery, Cecil Lapeyrouse Seafood Bar and Restaurant, Madison Seafood, Castex Energy facility in Montegut, and Shell Pipeline Co. – Lake Barre Crude Oil Pressure Boosting Station. No information relating to petroleum products or hazardous waste was available concerning these facilities. Information gathered regarding the Crosstex LIG Liquids facility, Bob's Bayou Black Marina, Petro Quest Energy, LLC, Transcontinental Gas Pipeline Company, Daneco Alligator Farm, and the Falgout Canal Marina identified within Section A is described below.

Crosstex LIG Liquids – Gibson Gas Plant, 5609 Bayou Black Drive, LA 70356, EPA ID# LAR000068528, AI# 25905, 33190, and 93903: This RCRA-SQG and AST facility is located on an eastern adjoining property to the Barrier Plan alignment of the site. The facility operates as a natural gas routing and production facility. Records were obtained for this facility dating back to 1980. According to a RCRA Subtitle C Identification Form for the calendar year 2010, the facility did not generate any hazardous waste; however, the facility historically reported generation of the following wastes: D001 – general ignitable waste, D035 – Methyl Ethyl Ketone, F004 – spent non-halogenated solvents, and F005 – spent non-halogenated solvents. Information obtained from the LDEQ EDMS lists the following hazardous materials located at the site: an aggregate of approximately 10,000 gallons of oil, fuel oil, and used oil ASTs, a 250-gallon diesel AST, and a 250-gallon methanol AST. In July 1995, disclosure of unauthorized, non-point discharges of liquefied natural gas and condensate was provided to the LDEQ. During a limited site investigation at the facility in April 1996 by Dames & Moore, elevated levels of TPH-G in soil at two near-surface boring locations and elevated levels of benzene in groundwater were observed. A subsequent assessment performed in February 1998 by Fluor Daniels identified levels below the negotiated target levels for the facility; however, re-assessment performed in July 1999 by URS identified levels of TPH-G, TPH-D, and benzene above the RECAP screening standard for soil. A subsequent Corrective Action Plan submitted to the LDEQ by TRC in August 2004 under RECAP MO-1 and MO-2, which identified four TPH-DRO constituents exceeding the SS_{ni} RS for Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, and Indeno(1,2,3-cd)pyrene only, was approved with the recommendation of source removal. In October 2004, TRC removed soil from a 10-foot by 10-foot by 6-foot volume and submitted samples from the sidewalls of the excavation which yielded all chemicals of concern below their respective RS and a NFA-ATT was requested. No further information was available regarding this RECAP event. Further documentation was reviewed regarding operations conducted at the facility by Meridian Resources and Exploration, LLC. Meridian has operated a glycol dehydration unit at the facility since approximately 1997; RECAP analysis of soil and groundwater around this unit in April 2010 showed that TPH-G and Benzene exceeded the RECAP SS_i for soil and TPH-G, Benzene, and Xylenes exceeded the RECAP standard for groundwater. Investigation of this incident is on-going at this facility. Based on the information gathered during this investigation, off-site concerns were noted from this facility.

Bob's Bayou Black Marina, 251 Marina Drive, Gibson, LA, 70356, EPA ID# NA, AI# 164430: This AST facility is located within the Barrier Plan alignment portion of Section A. The facility operates as a boat launch and fueling station. During AEROSTAR's site inspection, one approximate 1,000-gallon AST containing gasoline, one approximate 5000-gallon AST, containing diesel, and one approximate 250-gallon AST containing unknown product was observed in secondary containment along a canal leading to Lake Cocodrie. The facility is listed as permitted by the Department of Health and Hospitals to operate an aerobic sewage treatment system at the facility but has not applied for a permit with the LDEQ. Based on the information gathered during this investigation, on-site concerns were noted from this facility.

Petro Quest Energy LLC, 5299 Bayou Black Drive, Gibson, LA, 70356, EPA ID# NA, AI# 166828: This AST facility is located within the Barrier Plan alignment portion of Section A. The facility operates as a supplier of equipment and products for the oil and gas industry. During AEROSTAR's site inspection, at least 12 metal 55-gallon drums and 14 polycarbonate 55-gallon drums containing unknown product were observed resting on bare earth along a canal leading to Lake Cocodrie. In addition, approximately 200 feet northwest of the facility approximately three drums were observed buried in heavy brush. The facility is listed as permitted by the Department of Health and Hospitals to operate an aerobic sewage treatment system at the facility but has not applied for a permit with the LDEQ. Based on the information gathered during this investigation, on-site concerns were noted from this facility.

Transcontinental Gas Pipeline Company - Williams Facility, 4711 Bayou Black Drive, Gibson, LA 70356, EPA ID# LAD985206366, LAD981903115, AI#s 22982, 32991, 17734, and 17725: This RCRA-CESQG and AST facility is located within the Barrier Plan alignment of Section A. The facility operates as an oil and gas exploration, processing, and routing facility. Based on the information reviewed, this facility has been in operation since at least 1962. According to a RCRA Subtitle C Identification Form for the calendar year 2007, the facility reported generation of the following wastes: D001 – general ignitable waste, D008 – Lead, D018 - Benzene, F003 – spent non-halogenated solvents, and F005 – spent non-halogenated solvents. A Phase II sampling event dated March 2010 was performed by a conglomerate of private legal and environmental firms representing the facility by consent decree during 2006 and 2007. The consent decree pertains to the identification of two historical unregulated waste pits located at the facility. Soil and groundwater sampling was performed in the area of the former waste pits. Arsenic, Benzene, and TPH-D were identified above thresholds established by the consent decree but below RECAP SS_i; an Arsenic groundwater plume was identified but not delineated as part of this investigation. Additionally, dissolved Lead, Benzene, Chloroethane, TPH-D, and NPHC were identified in groundwater above thresholds established by the consent decree. This investigation and remediation activities regarding this incident are on-going at the facility. Based on the information gathered during this investigation, on-site concerns were noted from this facility.

Daneco LLC Alligator Farm, 130 Daneco Court, Houma, LA 70036, EPA ID# NA, AI# 52025: This AST facility is located within the Barrier Plan northern alignment of the site. The facility operates as an alligator skinning and slaughter hatchery. According to the information reviewed, two 5,000-gallon Avgas ASTs, one 2,000-gallon gasoline AST, and one 1,000-gallon diesel AST are located at the facility. During the site inspection, the diesel AST was observed covered in secondary containment. Based on the information gathered during this investigation, on-site concerns were noted from this facility.

Falgout Canal Marina, 1868 Dr. Beatrous Road, Theriot, LA 70397, EPA ID# NA, AI#:169223: This AST facility is located within the southern portion of the segment and operates as a boat launch and fueling facility. According to the information reviewed, as of April 2010, the facility has been permitted to operate an in-ground, 2,000-gallon extended aeration waste water treatment system consisting of activated sludge with chlorination limited to discharges totaling 5,000 gallons per day. During the site inspection, two approximate 1,000-gallon ASTs containing unknown product were observed along the

Falgout Canal. Based on the information gathered during this investigation, on-site concerns were noted from this facility.

5.2 Additional Environmental Record Sources

AEROSTAR performed a review of gas and oil production wells on the LDNR website for the subject site and vicinity. The wells are located in numerous fields and are owned by several different operators. Those wells located on the site and within approximately 500 feet of the subject corridor are discussed In Appendix C.

According to research information reviewed, a common procedure in vertical and directional oil drilling involves combining oil, water, or synthetic oil with other chemicals to form a drilling mixture that is circulated through the bore hole. These mixtures frequently contain materials such as oil and grease, suspended solids, phenol, arsenic, chromium, cadmium, lead, mercury, naturally occurring radioactive materials, and barium. The composition of drilling muds varies widely depending on the location and depth of the well and the type of drilling fluid used. Directional drilling sites frequently require up to two acres of land to stage the drilling rig, well, and support infrastructure, which causes significant soil erosion, soil loss, and sediment contamination of surface waters during the preparation and development of the drilling site. Drilling techniques require extensive use of gas or oil powered drilling equipment which can cause environmental impacts through accidental releases or leaks. Based on the information reviewed as part of this investigation, on-site concerns and off-site concerns were noted from the former drilling operations associated with each well.

5.3 Physical Setting Sources

Section A

The “Gibson, Louisiana,” “Bayou Cocodrie, Lousiana,” “Humphreys, Louisiana,” and “Lake Theriot, Louisiana" USGS topographic quadrangle maps; and regulatory files available regarding properties of environmental concern in the site vicinity were reviewed as sources for obtaining information regarding the physical setting of the site and surrounding vicinity.

Section B

The “Lake Theriot, Louisiana,” “Dulac, Louisiana,” “Lake Quitman, Louisiana,” “Lake Tambour, Louisiana,” and “Montegut, Louisiana” USGS topographic quadrangle maps; and regulatory files available regarding properties of environmental concern in the site vicinity were reviewed as sources for obtaining information regarding the physical setting of the site and surrounding vicinity.

Section C

The “Cut Off, Louisiana,” “Lake Bully Camp, Louisiana,” “Larose, Louisiana,” and “Montegut, Louisiana,” USGS topographic quadrangle maps; and regulatory files available regarding properties of environmental concern in the site vicinity were reviewed as sources for obtaining information regarding the physical setting of the site and surrounding vicinity.

5.3.1 Regional Geology

Terrebonne and Lafourche Parishes are two of Louisiana’s most southern parishes bordering the Gulf of Mexico. The parishes are located on the Coastal Plain Physiographic Province of Louisiana. Based on information obtained from the US Army Corp of Engineers-Engineering Geology and Geophysics Branch website, the soils beneath the site consist of swamp deposited clays from land surface to approximately 5 feet BLS. From 5 to approximately 200 feet BLS, the soils consist of interdistributary undifferentiated soils, followed by Holocene/Pleistocene Substratum sand deposits to approximately 300 feet BLS. Beneath the Substratum Deposits lie the Praire Pleistocene fine grained deposits to a depth of at least 540 feet.

5.3.2 Topography

Section A

The area of the investigation is referenced in the 7.5-minute USGS Topographical Quadrangle Maps of Gibson, Louisiana," dated 1998, "Bayou Cocodrie, Lousiana," dated 1980, "Humpreys, Louisiana," dated 1998 and "Lake Theriot, Louisiana," dated 1994. Based on a review of the topographic map, the segment has little to no topographic relief. According to the topographic map, the site is situated at an elevation of approximately 0 to 5 feet above the NGVD of 1929.

Surface water bodies were identified on the topographic map in the vicinity of Section A. Bayou Black is located approximately 1,000 feet northeast along the northern portion of the segment. The Shell Canal is located approximately 500 feet southwest of the northern portion of the segment. The GIWW intersects the segment in the central portion. The Minor Canal is located within the central portion of the segment. Lake Hatch is located approximately 0.5-mile west of the central portion of the segment. The Marmande Canal intersects the site in the southern portion of the segment. The Thibodaux Canal runs parallel to the segment in the southern portion. The Falgout Canal is located within the segment in the southern portion. Bayou Dularge runs parallel to the southern portion of the segment approximately 0.5-mile to the east.

Based upon a review of the topographic map, regional shallow groundwater and surface water flow in the immediate vicinity of the site appears to be towards the south. Actual groundwater flow in the vicinity of the property may be locally influenced by seasonal rainfall, proximity to surface bodies of water (lakes, rivers, canals), surface topography, underground structures, soil and bedrock geology, production wells and other factors beyond the scope of this study.

Section B

The area of the investigation is referenced in the 7.5-minute USGS Topographical Quadrangle Maps of: "Lake Theriot, Louisiana," dated 1998, "Dulac, Louisiana," dated 1994, "Lake Quitman, Louisiana," dated 1994, "Lake Tambour, Louisiana," dated 1994, and "Montegut, Louisiana," dated 1994. Based on a review of the topographic maps, the segment has little to no topographic relief. According to the topographic map, the site is situated at an elevation of approximately 0 to 5 feet above the NGVD of 1929.

Surface water bodies were identified on the topographic map in the vicinity of Section B. Bayou Dularge intersects Reach E-2. Falgout Canal adjoins Reaches E-1 and E-2. The Houma Navigational Canal adjoins F-1 and F-2. Bayou Grand Caillou intersects the Houma Navigational Canal and is located within Reach F-2. Deep Bayou and Wax Bayou cross Reach G-2. Grassy Bayou and Four Point Bayou cross Alternate Alignment 1. Grassy Bayou is located within Reach G-3. Alternate Alignments 1 and 2 cross Sweetwater Pond. Part of Bayou Sale is located within Reach G-2 and crosses Alternate Alignment 2. Portions of Bayou Terrebonne are located within Reaches H-3, I-1, I-2 and adjoining I-3. Bush Canal intersects Bayou Terrebonne within Reach I-1. Portions of Bayou Petit Calliou are located within Reaches H-1 and H-2. Lapeyrouse Canal intersects Bayou Petit Calliou within Reach H-2. Robinson Canal intersects Reaches H-2 and H-3. Bayou la Cache is located within a portion of Reach H-3. A portion of another canal, also named Lapeyrouse Canal, is located within Reach I-2. Madison Canal intersects Bayou Terrebonne within Reach I-1. Humble Canal, the eastern terminus of the segment, is located within I-3.

Based upon a review of the topographic map, regional shallow groundwater and surface water flow in the immediate vicinity of the site appears to be towards the south. Actual groundwater flow in the vicinity of the property may be locally influenced by seasonal rainfall, proximity to surface bodies of water (lakes, rivers, canals), surface topography, underground structures, soil and bedrock geology, production wells and other factors beyond the scope of this study.

Section C

The area of the investigation is referenced in the 7.5-minute USGS Topographical Quadrangle Maps of : The "Cut Off, Louisiana," dated 1998, "Lake Bully Camp, Louisiana," dated 1994, "Larose, Louisiana," dated 1998, and "Montegut, Louisiana," dated 1994. Based on a review of the topographic maps, the segment has little to no topographic relief. According to the topographic map, the site is situated at an elevation of approximately 0 to 5 feet above the NGVD of 1929.

Surface water bodies were identified on the topographic map in the vicinity of Section C. Humble Canal adjoins Reach J-2 in the western portion of Section C. Wonder Lake adjoins Reach J-2 to the south. Bayou Pointe aux Chenes adjoins Reaches J-2, J-1, J-3, and K. Bayou St. Jean Charles adjoins Reaches J-1 and J-2. Bayou Blue adjoins Reaches L and L-3. Grand Bayou Canal is located within Reaches K, L, and L-3.

Based upon a review of the topographic map, regional shallow groundwater and surface water flow in the immediate vicinity of the site appears to be towards the south. Actual groundwater flow in the vicinity of the property may be locally influenced by seasonal rainfall, proximity to surface bodies of water (lakes, rivers, canals), surface topography, underground structures, soil and bedrock geology, production wells and other factors beyond the scope of this study.

5.3.3 Soils/Geology

Section A

The United States Department of Agriculture Soil Conservation Service, *Web Soil Survey* was utilized to identify native soil characteristics in the vicinity of the site. Copies of the *Web Soil Survey* reports generated as part of this investigation are included in Appendix D. According to the survey, the soils are primarily classified as Allemands muck, Aquents (dredged), Barbary muck, Cancienne silt loam, Cancienne silty clay loam, Clovelly muck, Fausse clay, Kenner muck, Lafitte muck, Larose muck, Rita muck, Schriever clay, and open water. The soils names and depth to water are listed below in Table 4A.

TABLE 4A
Summary of Soils – Section A

Soil Name	Depth to Water
Allemands muck, very frequently flooded	About 0 to 6 inches
Aquents dredged, 1 to 5 percent slopes, occasionally flooded	More than 80 inches
Barbary muck, frequently flooded	About 0 to 6 inches
Cancienne silt loam, 0 to 1 percent slopes	About 18 to 48 inches
Cancienne silty clay loam, 0 to 1 percent slopes	About 18 to 48 inches

TABLE 4A
Summary of Soils – Section A

Soil Name	Depth to Water
Cancienne silt loam, 0 to 1 percent slopes, occasionally flooded	About 18 to 48 inches
Clovelly muck, very slightly saline, tidal	About 0 to 6 inches
Fausse clay, frequently flooded	About 0 to 6 inches
Gramercy silty clay loam, 0 to 1 percent slopes	About 0 to 24 inches
Gramercy-Cancienne silty clay loam, 0 to 1 percent slopes	About 0 to 24 inches
Kenner muck, very frequently flooded	About 0 to 6 inches
Lafitte muck, very slightly saline, tidal	About 0 to 6 inches
Larose muck, very frequently flooded	About 0 to 6 inches
Rita muck, occasionally flooded	About 12 to 36 inches
Schriever clay, 0 to 1 percent slopes	About 0 to 24 inches
Schriever clay, frequently flooded	About 0 to 24 inches
Schriever clay, occasionally flooded	About 0 to 24 inches
Urban land	Not Applicable
Open water	Not Applicable

Section B

The United States Department of Agriculture Soil Conservation Service, *Web Soil Survey* was utilized to identify native soil characteristics in the vicinity of the site. Copies of the *Web Soil Survey* reports generated as part of this investigation are included in Appendix D. According to the survey, the soils are primarily classified as Allemands muck, Aquents (dredged), Bancker muck, Barbary muck, Bellpass muck, Cancienne silt loam, Cancienne silty clay loam, Clovelly muck, Fausse clay, Gramercy-Cancienne silty clay loam, Kenner muck, Lafitte muck, Larose muck, Rita muck, Scatlake muck, Schriever clay, timbalier muck and open water. The soils names and depth to water are listed below in Table 4B.

TABLE 4B
Summary of Soils – Section B

Soil Name	Depth to Water
Allemands muck, very frequently flooded	About 0 to 6 inches
Aquents dredged, 1 to 5 percent slopes, occasionally flooded	More than 80 inches
Barbary muck, frequently flooded	About 0 to 6 inches
Bancker muck, slightly saline, tidal	About 0 to 6 inches
Bancker muck, very slightly saline, tidal	About 0 to 6 inches
Bellpass muck, tidal	About 0 to 6 inches
Cancienne silt loam, 0 to 1 percent slopes	About 18 to 48 inches
Cancienne silty clay loam, 0 to 1 percent slopes	About 18 to 48 inches
Cancienne silty clay loam, 0 to 1 percent slopes, occasionally flooded	About 18 to 48 inches

TABLE 4B Summary of Soils – Section B	
Soil Name	**Depth to Water**
Cancienne silt loam, 0 to 1 percent slopes, occasionally flooded	About 18 to 48 inches
Clovelly muck, slightly saline, tidal	About 0 to 6 inches
Clovelly muck, very slightly saline, tidal	About 0 to 6 inches
Fausse clay, frequently flooded	About 0 to 6 inches
Gramercy-Cancienne silty clay loam, 0 to 1 percent slopes	About 0 to 24 inches
Kenner muck, very frequently flooded	About 0 to 6 inches
Lafitte muck, slightly saline, tidal	About 0 to 6 inches
Lafitte muck, very slightly saline, tidal	About 0 to 6 inches
Larose muck, very frequently flooded	About 0 to 6 inches
Rita muck, occasionally flooded	About 12 to 36 inches
Scatlake muck, tidal	About 0 to 6 inches
Schriever clay, 0 to 1 percent slopes	About 0 to 24 inches
Schriever clay, frequently flooded	About 0 to 24 inches
Schriever clay, occasionally flooded	About 0 to 24 inches
Timbalier muck, tidal	About 0 to 24 inches
Open water	Not Applicable

Section C

The United States Department of Agriculture Soil Conservation Service, *Web Soil Survey* was utilized to identify native soil characteristics in the vicinity of the site. Copies of the *Web Soil Survey* reports generated as part of this investigation are included in Appendix D. According to the survey, the soils are primarily classified as Allemands muck, Aquents (dredged), Bancker muck, Cancienne silt loam, Cancienne silty clay loam, Clovelly muck, Fausse clay, Fausse-Schriever association, Lafitte-Clovelly association, Lafitte muck, Kenner muck, Rita muck, Schriever clay, Timbalier-Bellpass association. The soils names and depth to water are listed below in Table 4C.

TABLE 4C Summary of Soils – Section C	
Soil Name	**Depth to Water**
Allemands muck	About 0 inches
Aquents, dredged	More than 80 inches
Bancker muck, slightly saline	About 0 to 6 inches
Cancienne silt loam	About 18 to 48 inches
Cancienne silty clay loam	About 18 to 48 inches
Clovelly muck, slightly saline	About 0 to 6 inches
Clovelly muck, very slightly saline	About 0 to 6 inches

TABLE 4C Summary of Soils – Section C	
Soil Name	**Depth to Water**
Fausse clay, frequently flooded	About 0 to 6 inches
Fausse-Schriever association	About 0 inches
Lafitte-Clovelly association	About 0 inches
Lafitte muck, slightly saline, tidal	About 0 to 6 inches
Lafitte muck, very slightly saline	About 0 to 6 inches
Kenner muck	About 0 inches
Rita muck, occasionally flooded	About 12 to 36 inches
Schriever clay, frequently flooded	About 0 to 24 inches
Schriever clay, occasionally flooded	About 0 to 24 inches
Timbalier-Bellpass association	About 0 inches

5.3.4 Hydrogeology

The aquifer system of Southeastern Louisiana is made up of five sand aquifers. Shallow sand, 200 foot sand, 400 foot sand, 700 foot sand, and 1,200 foot sand are the aquifers within the system. The shallow aquifers are not extensive enough to yield sufficient quantities of water. In these shallow aquifers the water is not considered potable. The majority of water yielded has a chloride content greater than 250 parts per million. The principle aquifer in the area is the 700 foot sand aquifer. It supplies the portion of the parish that is west of the Mississippi River. This aquifer has a chloride content less than 250 parts per million.

5.4 Historical Use Information on the Site

Historical use information was obtained from the review of aerial photographs, historical topographic maps and interviews.

Section A

Based on the review of aerial photographs and historical topographic maps, the historical development of Section A appeared as primarily undeveloped land and wetlands in 1892 in the northern portion and 1894 in the southern portion. Section A appeared as undeveloped wetlands with agricultural development along the eastern portion to the north and center of the segment while still undeveloped in the southern portion of the segment in 1940. The North Terrebonne Gas Plant, the Falgout Canal, and Brady Road have been visible since 1944 in the southern portion of the segment. The Transcontinental Pipeline Company, the Northeast Gibson Oil and Gas Field, Waterproof Ridge Farm and the Sunrise Oil and Gas Field have been developed at the site since at least 1964. The Falgout Canal Marina has been developed since at least 1971. Bob's Bayou Black Marina and the existing levees have been developed since at least 1981.

Section B

Section B appeared as primarily undeveloped land and wetlands with Four Point Road, State Highways 55, 56 and 57, Bayou Dularge, and Bayou Terrebonne crossing or adjoining the segment since at least

1893. Falgout Canal and Brady Road, in the western portion of the segment, and Humble Canal and Point Barre Road, in the eastern portion of the segment, have been visible since at least 1944. Falgout Canal Road was under construction by 1964 and completed by 1971. Houma Navigational Canal, which crosses and adjoins Section B in the western portion of the segment, has been visible since 1964. The present-day Plains All American crude oil pipeline transportation facility, located where Reaches H-1 and H-2 meet, has been visible since 1971. The present-day FAA Air Traffic Control facility has been visible since 1990. The Bayou Terrebonne Floodgate, in the eastern portion of the segment, has been visible since 1998. The present-day Shell Pipeline Co. Lake Barre Booster Station has been visible since 1998.

Section C

Section C appeared as primarily undeveloped land and wetlands from at least 1894 to at least 1941. Levees along State Highway 665, located within Reaches J-1, J-2, and J-3, have been visible since at least 1980. Reaches K, L, and L-3 have been undeveloped and wetlands since at least 1894. Reaches J-1, J-3, and the eastern portion of J-2 have been residentially and commercially developed since at least 1953.

5.5 Historical Use of Adjoining Properties

Historical use information of adjoining properties was obtained from the review of aerial photographs, historical topographic maps and interviews.

Section A

Section A's adjoining properties has appeared as primarily undeveloped wetlands or rural-residential and agricultural land since at least 1940. The northern, western, and southern adjoining properties has been undeveloped wetlands since at least 1894. The eastern adjoining properties have consisted of commercial-industrial with mixed rural-residential property in the northern portion since at least 1940.

Section B

Section B's adjoining properties appeared as primarily undeveloped land and wetlands with Four Point Road, State Highways 55, 56 and 57, Bayou Dularge, and Bayou Terrebonne visible from at least 1893 to at least 1944. Increasingly more residential and commercial-type structures have been visible since 1957. The present-day Castex Energy Inc., Lapeyrouse Commingling facility has been visible on the western adjoining property, adjacent to Reach H-3, since 1980.

Section C

Section C's adjoining properties appeared as primarily undeveloped land and wetlands since at least 1894 to at least 1941. The western adjoining properties have been developed with the Humble Canal since at least 1941. The eastern and central adjoining properties were developed agriculturally from at least 1953 to at least 1980. The Grand Bayou Canal has been present since at least 1894. The eastern adjoining properties have been residentially and commercially developed since at least 1953. The southern adjoining properties have remained primarily undeveloped since at least 1894.

5.6 Standard Historical Sources Reviewed

5.6.1 Aerial Photograph Review

Section A

To evaluate the previous land uses of the property and surrounding area, a series of aerial photographs was reviewed. The aerial photographs provide a progressive overview of parcels pertaining to this assessment.

AEROSTAR personnel reviewed aerial photographs from 1940, 1957, 1971, 1980, and 1990 provided by NRCS; 1998 provided by LDNR; and 2007 provided by the USDA. Copies of the aerial photographs from 1940, 1957, 1971, 1981, 1990, and 1998 are included on a CD in Appendix D. The 2007 aerials are illustrated as Figures 3-1 through 3-5. Descriptions of AEROSTAR's observations are outlined in Table 5A.

TABLE 5A
Summary of Aerial Photograph Observations – Section A

Source	Photograph Date	Photograph Scale	Remarks
COC-2A-38 COC-2A-58 COC-2A-75 COC-2A-108 COC-3A-23 COC-3A-117 COC-3A-115 **Full site coverage not provided**	1940	NA	Site: Undeveloped wetlands, except for agricultural land in the central portion; the GIWW is visible in the central portion. North: Not visible. East: Undeveloped wetlands in the central portion and agricultural land in remainder; Bayou Black is visible along the northern portion of the segment. South: Not visible. West: Undeveloped wetlands.
CQC-6T-40 CQC-6T-80 CQC-6T-88 CQC-6T-154 CQC-6T-184 CQC-7T-40 CQC-7T-61 CQC-7T-141 CQC-7T-155 **Full site coverage not provided**	1957	NA	Site: Primarily undeveloped wetlands; the North Terrebonne Gas Plant is visible in the northern portion; the Northeast Gibson Oil and Gas Field is visible in the northern portion; the Waterproof Ridge Farm is visible in central portion; a man-made canal is visible along the southern portion of the segment with several linear pathways visible extending into the interior of or through Section A from the eastern adjoining properties. North: Undeveloped land. East: Rural-residential and possible agricultural land are visible in the southern portion of the segment. South: Undeveloped wetlands. West: Undeveloped wetlands and open water is visible in the southern portion of the segment.

TABLE 5A
Summary of Aerial Photograph Observations – Section A

Source	Photograph Date	Photograph Scale	Remarks
CQC-1MM-182 CQC-1MM-184 CQC-1MM-186 CQC-1MM-214 CQC-1MM-216 CQC-2MM-39 CQC-2MM-141	1971	NA	Site: Agricultural land is visible at the northern terminus of the segment; numerous man-made canals are visible traversing the undeveloped wetlands in the northern portion of the segment at the Sunrise Oil and Gas Field; the Falgout Canal Marina is visible at the southern terminus of Section A. North: No change. East: The Transcontinental Pipeline Company is visible in the northern portion, otherwise no change. South: No change. West: The Gibson Oil and Gas Field and Orange Grove Oil and Gas Field are visible in the northern portion of the properties; otherwise, no change.
NRCS	1980	NA	Site: Bob's Bayou Black Marina is visible in the northern portion; further development of the North Terrebonne Gas Plant is visible; the existing levee is visible in the southern portion of the segment; the Falgout Canal Marina appears developed to its current state. North: No change. East: No change. South: No change. West: Further development of oil field areas is visible, otherwise, no change.
1423-125 1423-127 1423-166 1423-206 4159-85 4159-87 4159-89	1990	NA	Site: No change. North: No change. East: No change. South: No change. West: No change.
LDNR	1998	NA	Site: No change. North: No change. East: No change. South: No change. West: No change.
USDA	2007	NA	Site: No change. North: No change. East: No change. South: No change. West: No change.

Section B

To evaluate the previous land uses of the property and surrounding area, a series of aerial photographs was reviewed. The aerial photographs provide a progressive overview of parcels pertaining to this assessment.

AEROSTAR personnel reviewed aerial photographs from 1940, 1957, 1971, 1980, and 1990 provided by NRCS; 1998, provided by the LDNR; and 2007, provided by the USDA. Copies of the aerial photographs 1957, 1971, 1980, 1990, and 1998 are included on a CD in Appendix D. The 1940 series did not cover Section B. The 2007 aerials are illustrated as Figures 3-6 through 3-8 in Appendix A. Descriptions of AEROSTAR's observations are outlined in Table 5B.

TABLE 5B
Summary of Aerial Photograph Observations – Section B

Source	Photograph Date	Photograph Scale	Remarks
CQC-5T-208 CQC-6T-88 CQC-6T-90 **Western portion of Section B, Reaches E-1, E-2, F-1, F-2, G-1 and Alternate Alignment 1 are covered**	1957	NA	Site: The site is primarily undeveloped land and wetlands. In the western portion of Section B, Brady Road, Bayou Dularge, and Falgout Canal are visible. Houma Navigational Canal is not visible. Cleared fields are visible where Alternate Alignment 1 crosses Four Point Road. North: Primarily undeveloped land and wetlands. Structures are visible in the westernmost portion, north and south of Bayou Dularge. East: Undeveloped land and wetlands. South: Undeveloped land, wetlands, canals and open water. West: Primarily undeveloped land and wetlands. Some structures are visible west of the segment along State Highway 55 (Montegut Road).

TABLE 5B
Summary of Aerial Photograph Observations – Section B

Source	Photograph Date	Photograph Scale	Remarks
CQC-1MM-124 CQC-1MM-131 CQC-1MM-182 CQC-2MM-21 CQC-2MM-23 CQC-2MM-24 **Portions of Reaches H-2 and H-3 are not covered**	1971	NA	Site: Falgout Canal Road is visible in the western portion of Section B. Two apparent dredge spoil areas are visible along Reaches F-1 and F-2, west of the Houma Navigational Canal. Cleared fields are visible where Alternate Alignment 1 and Reaches G-1 and G-2 cross Four Point Road. Large ASTs are visible where Reaches H-1 and H-2 meet at State Highway 56 at the present-day location of the Plains All American Pipeline facility. Humble Canal and Humble Canal Road are visible at the eastern terminus. Point Barre Road is visible in the eastern portion. More structures are visible along the roadways. North: More structures visible around Bayou Dularge, north of the western terminus of Section B. East: Falgout Canal Road Bridge, crossing the Houma Navigational Canal, is visible. Structures are visible on the adjoining property east of Reaches F-1 and F-2, across Houma Navigational Canal. South: No significant change, except that the present-day levee south of Falgout Canal and east of Bayou Dularge is visible. West: No significant change, except more structures visible along State Highway 55 (Montegut Road).
378-49 378-81 378-47 278-12 178-293 178-295 278-14 378-49	1980	NA	Site: No significant change. North: More structures are visible around Bayou Dularge, north of the western terminus of Section B. East: No significant change. South: No significant change. West: No significant change, except more structures are visible along State Highway 55 (Montegut Road). Present-day Castex Energy Inc, Lapeyrouse Commingling Facility is visible adjoining Reach H-3 on State Highway 56. Cleared roads into the wetlands for oil and gas wells are visible west of Reach H-3.
4159-112 4159-28 4159-23 4159-89 4159-91 1417-20 **Most of Reach I-3 is not covered**	1990	NA	Site: FAA Air Traffic Control facility is visible along Highway 57 within Reach H-1. North: No significant change. East: No significant change. South: No significant change. West: Lapeyrouse Campground and Lapeyrouse Seafood Bar and Grocery is area visible adjoining Reach H-3.

TABLE 5B
Summary of Aerial Photograph Observations – Section B

Source	Photograph Date	Photograph Scale	Remarks
LDNR GIS Database	1998	NA	Site: Bayou Terrebonne Floodgate is visible. Shell Pipeline Co. Lake Barre Booster Station Dock is visible within Reach H-2. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
USDA	2007	NA	Site: No significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.

Section C

To evaluate the previous land uses of the property and surrounding area, a series of aerial photographs was reviewed. The aerial photographs provide a progressive overview of parcels pertaining to this assessment.

AEROSTAR personnel reviewed aerial photographs from 1940-1941, 1953, 1971, 1980, and 1990 provided by NRCS; 1998, provided by the LDNR; and 2007, provided by the USDA. Copies of the 1953, 1971, 1980, 1990, and 1998 are included on a CD in Appendix D. The 1941, 1953, and 1990 series did not cover all of Section C. The 2007 aerials are illustrated as Figures 3-9 and 3-10 in Appendix A. Descriptions of AEROSTAR's observations are outlined in Table 5C.

TABLE 5C
Summary of Aerial Photograph Observations – Section C

Source	Photograph Date	Photograph Scale	Remarks
NRCS 00705D 00707D **Full site coverage not provided**	1940-1941	NA	Site: Undeveloped land and wetlands. Humble Canal is visible. North: Undeveloped land and wetlands. East: Undeveloped land and wetlands. Bayou Pointe au Chene is visible. South: Wonder Lake is visible in Reach J-2 followed by undeveloped land and wetlands. West: Cleared agricultural fields are visible west of Humble Canal along State Highway 55.

TABLE 5C
Summary of Aerial Photograph Observations – Section C

Source	Photograph Date	Photograph Scale	Remarks
NRCS Terrebonne Parish Soil Survey	1953	NA	Site: No significant change. North: Gas pipeline is visible and labeled. Bayou St. Jean Charles is visible and labeled. East: Cleared agricultural fields are visible along of Bayou Pointe aux Chenes and State Highway 665. South: Bayou St. Jean Charles is visible and labeled. West: No significant change.
NRCS 00860D 00862D 00863D	1970	NA	Site: Farmland is visible along of Bayou Pointe aux Chenes and State Highway 665. No other significant change. North: Canals are visible. East: Additional residential-type structures are visible along Reach J-1 and Reach J-3 (State Highway 665). South: No significant change. West: No significant change.
NRCS 00994D 01000D 01005D 01006D Lafourche Parish Soil Survey	1980	NA	Site: Additional levees are visible within Reach J-2 and J-1 near State Highway 665. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
NRCS 01300D 01432D 01439D **Full site coverage not provided**	1990	NA	Site: Marina is visible within Reach K. No other significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
LDNR	1998	NA	Site: No significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
LDNR	2008	NA	Site: No significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.

5.6.2 Property Ownership Records

Property ownership records were not researched for this investigation at the request of the Client. A chain-of-title was not provided to AEROSTAR by the Client or User.

5.6.3 City Directory Review

Historical city directories were not researched for this investigation at the request of the Client.

5.6.4 Fire Insurance Map Review

Fire Insurance Maps did not provide coverage for the site.

5.6.5 Other Historical Sources

Additional historical sources were reviewed during this investigation.

5.6.5.1 Topographic Maps

Section A

The following historical topographic maps were provided by FTC or acquired from the USGS: "Gibson, Louisiana," dated 1892, 1944, 1964, photorevised 1980, and 1998; "Bayou du Large, Louisiana," dated 1894 and 1944; "Bayou Cocodrie, Louisiana," dated 1964, and photorevised 1980; "Humphreys, Louisiana," dated 1964, photorevised 1980, and 1998; and "Lake Theriot, Louisiana," dated 1964, photorevised 1980, and 1994. Historical topographic maps are included on a CD in Appendix D. Descriptions of AEROSTAR's observations are outlined in Table 6A.

TABLE 6A
Summary of Historical Topographic Map Observations – Section A

Source	Map Date	Map Scale	Remarks
FTC	1892; 1894	1:62,500	Site: Developed land is visible in the central portion; undeveloped wetlands are in the remainder. North: Undeveloped. East: Developed land is visible in the northern portion; wetlands are visible in the remainder. South: Undeveloped wetlands. West: Undeveloped wetlands.

FTC	1944	1:62,500	Site: Developed land is visible in the northern portion; the GIWW is labeled in the central portion of the site; an Indian Mound is identified at a developed parcel in the southern portion; the Thibodaux Canal is labeled further south. North: No change. East: Developed in the southern portion. South: No change. West: Lake Hatch is labeled in the central portion.
FTC	1964	1:24,000	Site: Further development of property is visible in the northern portion; the Northeast Gibson Oil and Gas Field is labeled in the northern portion; the Sunrise Oil and Gas Field is labeled in the central portion; the South Sunrise Oil and Gas Field is labeled in the southern portion of the segment. North: No change. East: No change. South: Unlabeled surface water is visible. West: No change.
FTC	1964 (revised 1980)	1:24,000	Site: No change. North: No change. East: No change. South: No change. West: No change.
USGS **Map covers southern portion of segment**	1994	1:24,000	Site: No change. North: No change. East: No change. South: No change. West: Open water is shown in the wetlands area in the southern portion.
USGS **Map covers northern portion of segment**	1998	1:24,000	Site: The Mandalay National Wildlife Refuge is outlined in the central portion. North: No change. East: No change. South: No change. West: No change.

Section B

The following historical topographic maps were provided by FTC: “Bayou du Large, Louisiana,” dated 1893 and 1944, “Lake Theriot, Louisiana,” dated 1964 and 1964 (revised 1980), “Dulac, Louisiana,” dated 1894, 1944, 1964, and 1964 (revised 1980), “Lake Quitman, Louisiana,” dated 1964 and 1964 (revised 1980), “Lake Tambour, Louisiana,” dated 1964 and 1964 (revised 1980), and “Montegut, Louisiana,” dated 1963 (revised 1963). Historical topographic maps are included on a CD in Appendix D. Descriptions of AEROSTAR’s observations are outlined in Table 6B.

TABLE 6B
Summary of Historical Topographic Map Observations – Section B

Source	Map Date	Map Scale	Remarks
FTC	1893; 1894	1:62,500	Site: Primarily undeveloped land and wetlands. Bayou Dularge, Falgout Canal, Houma Navigational Canal and Falgout Canal Road, all presently located in the western portion of Section B, are not depicted. Four Point Road and State Highways 55, 56 and 57 are depicted. Bayou Terrebonne is depicted in the eastern portion of Section B. Some structures are depicted adjoining the roadways. North: Primarily undeveloped land and wetlands. East: Primarily undeveloped land and wetlands. South: Primarily undeveloped land, and wetlands. West: Primarily undeveloped land and wetlands.
FTC	1944	1:62,500	Site: Falgout Canal, in the western portion of Section B, is visible. Brady Road, west of Bayou Dularge, is visible as a trail road. The present-day Indian mound is labeled on State Highway 56. Humble Canal and Point Barre Road, (visible as a trail road), are depicted in the eastern portion of Section B. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
FTC	1963 1964	1:24,000	Site: Falgout Canal Road, in the western portion of Section B, is labeled as “under construction.” A ferry is labeled at the intersection of Falgout Canal and the Houma Navigational Canal. No structures are depicted on roadways. The present-day cemetery adjoining the Indian Mound is depicted on State Highway 56. Humble Canal Road is depicted in the eastern portion of Section B. North: No significant change. East: No significant change. South: No significant change. West: No significant change, except that two oil wells and one gas well are labeled west of Reach H-3.

TABLE 6B
Summary of Historical Topographic Map Observations – Section B

Source	Map Date	Map Scale	Remarks
USGS	1963 (revised 1980); 1964 (revised 1980)	1:24,000	Site: Falgout Canal Road, in the western portion of Section B, is depicted. More structures are depicted along State Highways 56 and 57. The six present-day ASTs are depicted at the crude oil pipeline facility on State Highway 56, where Reaches H-1 and H-2 meet. North: No significant change. East: Structures are depicted on the adjoining property east of Reaches F-1 and F-2, across the Houma Navigational Canal. South: No significant change. West: No significant change.
USGS	1994	1:24,000	Site: Falgout Canal Road, in the western portion of Section B, extends across the Houma Navigational Canal to the east. A structure is depicted in the present-day location of the FAA Air Traffic Control facility in Reach H-1. North: No significant change, except for more structures along roadways. East: No significant change. South: No significant change. West: No significant change.

Section C

The following historical topographic maps were provided by FTC: "Cut Off, Louisiana" dated 1892, 1963, and 1998; "Dulac, Louisiana," dated 1894; "Lake Bully Camp, Louisiana" dated 1994, 1964, and 1964 revision 1979; "Lake Felicity, Louisiana" dated 1894 and 1944; "Larose, Louisiana" dated 1998 and 1963 revision 1979; "Montegut, Louisiana" dated 1994, 1963, and 1963 revision 1980. Historical topographic maps are included on a CD in Appendix D. Descriptions of AEROSTAR's observations are outlined in Table 6C.

TABLE 6C
Summary of Historical Topographic Map Observations – Section C

Source	Map Date	Map Scale	Remarks
FTC	1894 1892	1:62,500	Site: Undeveloped land and wetlands. North: Undeveloped land and wetlands. East: Undeveloped land and wetlands. South: Undeveloped land and wetlands. West: Undeveloped land and wetlands.

FTC	1944	1:62,500	Site: Grand Bayou Canal, Cut Off Canal, and St. Louis Canal are depicted. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
FTC	1963 1964	1:24,000	Site: No significant change. North: No significant change. East: Structures are depicted along State Highway 665 and Bayou Pointe aux Chenes. South: No significant change. West: Structures are depicted along State Highway 55 and Humble Canal Road.
USGS	1963 (revised 1980); 1963 (revised 1979); 1964 (revised 1979)	1:24,000	Site: New levee depicted along Reaches J-2 and J-1. North: No significant change. East: No significant change. South: No significant change. West: Additional structures are depicted along State Highway 55 and Humble Canal Road.
USGS	1994	1:24,000	Site: No significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.
USGS	1998	1:24,000	Site: No significant change. North: No significant change. East: No significant change. South: No significant change. West: No significant change.

6.0 SITE RECONNAISSANCE

6.1 Methodology and Limiting Conditions

Visual and physical inspections conducted as part of this investigation included an inspection of properties from the right-of-way. Additionally, observations of access to and egress from the site were noted, as well as the presence and condition of any on-site buildings, utilities, or other improvements. AEROSTAR was not provided access to the interior of the site buildings at the time of the inspection. This visual and physical inspection of the site focused primarily on its surface features. Property use and significant features are indicated on the Site Plans which are included as Figures 3-1 through 3-10 in Appendix A. Site photographs are included in Appendix B.

6.2 General Site Setting

6.2.1 Section A

6.2.1.1 Current Use(s) of the Site

Section A consists of commercial-industrial land and wetlands with an existing levee, two industrial facilities, two oil and gas fields, and the Daneco Alligator Farm in the northern and central portion of the segment; and primarily agricultural land and wetlands, a pump station, and the Falgout Canal Marina located in the southern portion of the segment. The GIWW, used as a navigable waterway for shipping and commerce, intersects the site in the central portion of the segment with the Mandalay National Wildlife Refuge located north of the GIWW.

6.2.1.2 Past Use(s) of the Site

No indication of Section A’s previous use was observed during the site reconnaissance.

6.2.1.3 Current Uses of Adjoining Properties

The immediate vicinity surrounding Section A is primarily characterized by undeveloped wetlands to the west and south, commercial-industrial land in the northern portion, agricultural land in the central portion and rural-residential land in the southern portion to the east, and undeveloped land to the north.

6.2.1.4 Past Use(s) of the Adjoining Properties

No indication of the adjoining properties’ past uses was observed during the site reconnaissance.

6.2.1.5 Current or Past Use(s) in the Surrounding Area

No indication of the surrounding area’s past use was observed during the site reconnaissance.

6.2.1.6 Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions

No significant geologic, hydrogeologic or hydrologic conditions were observed during the site reconnaissance.

6.2.1.7 General Description of Structures

Bob's Bayou Black Marina, the North Terrebonne Gas Plant, the Transcontinental Pipeline Company – Williams Facility, the Daneco Alligator Farm and the Waterproof Ridge Farm were observed in the northern portion of the segment. The Falgout Canal Marina and associated camps and the Upper Bayou Dularge Pump Station are developed in the southern portion of the segment.

6.2.1.8 Roads

US Highway 90 is located at the northern terminus of the Barrier Plan alignment. Old Spanish Trail (Parish Road 11) and Geraldine Road intersect the Barrier Plan alignment in the northern portion of the segment. Bayou Black Road (Parish Road 182) is located approximately 1,000 feet east along the Barrier Plan alignment. Vega Court, Marina Drive, Shell E and P Road, and Daneco Court terminate or are located within the Barrier Plan alignment. Bayou Black Road (Parish Road 182) is located approximately 1,000 feet north of Section A. Gabi Court and Dr. Beatrous Road (Parish Road 59) are located within Section A of the alignment. Brady Drive (Parish Road 111) and Bayou Dularge Road (LA Highway 315) intersect Section A in the southern portion of the alignment.

6.2.1.9 Potable Water Supplies

Potable water is provided to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

6.2.1.10 Sewage Disposal System

Sewage disposal is provided to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

6.2.1.11 Other Conditions of Concern

No other conditions of concern were identified.

6.2.2 Section B

6.2.2.1 Current Use(s) of the Site

Section B consists of undeveloped land, wetlands, existing levee and roadways, residential and commercial properties, crude oil pipeline transportation facilities, a crude oil pipeline booster station, natural and petroleum pipeline right-of-ways, Bayou Terrebonne Floodgate, The Madison Pump Station, Falgout Canal Bridge, FAA Air Traffic Control facility, and a Native American mound and cemetery. Dump trucks and heavy machinery were observed on the levee within Reach I-1, apparently conducting earth-moving activities.

6.2.2.2 Past Use(s) of the Site

No indication of Section B's previous use was observed during the site reconnaissance.

6.2.2.3 Current Uses of Adjoining Properties

The immediate vicinity surrounding Section B is primarily characterized by undeveloped land, wetlands, and residential and commercial properties.

6.2.2.4 Past Use(s) of the Adjoining Properties

No indication of the adjoining properties' past uses was observed during the site reconnaissance.

6.2.2.5 Current or Past Use(s) in the Surrounding Area

No indication of the surrounding area's past use was observed during the site reconnaissance.

6.2.2.6 Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions

No significant geologic, hydrogeologic or hydrologic conditions were observed during the site reconnaissance.

6.2.2.7 General Description of Structures

Existing structures along Section B consist of residential and commercial structures, Falgout Canal Bridge, Bayou Terrebonne Floodgate, Madison Pump Station, buried natural gas and petroleum pipelines, the FAA Air Traffic Control facility, Plains All American Pipeline crude oil transportation facility, Shell Pipeline Co., LP – Lake Barre Booster Station dock facility, and a small Castex Energy booster station facility.

6.2.2.8 Roads

Falgout Canal Road (Parrish Road 10), Brady Road, and Bayou Dularge Road (State Highway 315) are located in Reach E-2. Falgout Canal Road also is located in Reach E-1. Four Point Road is located in Reach G-2 and Alternate Alignment 1. Bayou Sale Road (State Highway 57) is located in Reaches G-2, G-3 and H-1. Little Caillou Road (State Highway 56) is located in Reaches H-1, H-2, and H-3. Montegut Road (State Highway 55) is located in Reaches I-1, I-2 and I-3. Pointe Barre Road is located in Reach I-3. Humble Canal Road is located in Reach I-3. Shoreline Drive and Touloulou Street, located east of Little Caillou Road, and other smaller roads, are located in Reaches H-2 and H-3. Madison Canal Road is located in Reach I-2.

6.2.2.9 Potable Water Supplies

Potable water is provided to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

6.2.2.10 Sewage Disposal System

Sewage disposal is provided to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish.

6.2.2.11 Other Conditions of Concern

A marked petroleum pipeline was observed crossing Reach I-3, south of Point Barre Road, in an east-west direction across the segment.

6.2.3 Section C

6.2.3.1 Current Use(s) of the Site

Section C consists of undeveloped land, wetlands, existing levee and roadways, natural gas and petroleum pipeline right-of-ways, three pump stations, a marina, and residential and commercial properties. Observations made during the site reconnaissance are further discussed in Section 6 of this report.

6.2.3.2 Past Use(s) of the Site

No indication of Section C's previous use was observed during the site reconnaissance.

6.2.3.3 Current Uses of Adjoining Properties

The immediate vicinity surrounding Section C is primarily characterized by undeveloped land, wetlands, and residential and commercial properties.

6.2.3.4 Past Use(s) of the Adjoining Properties

No indication of the adjoining properties' past uses was observed during the site reconnaissance.

6.2.3.5 Current or Past Use(s) in the Surrounding Area

No indication of the surrounding area's past use was observed during the site reconnaissance.

6.2.3.6 Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions

No significant geologic, hydrogeologic or hydrologic conditions were observed during the site reconnaissance.

6.2.3.7 General Description of Structures

Existing structures along Section C consist of residential and commercial structures, buried natural gas and petroleum pipelines, flood water pump stations and the Pointe Aux Chene Marina.

6.2.3.8 Roads

State Highway 55 (Montegut Road) and Humble Canal Road are located in Reach J-2. State Highway 665 (Point Aux Chene Road) is located in Reaches J-2, J-1, J-3, and K. Island Road is located between Reaches J-1 and J-3.

6.2.3.9 Potable Water Supplies

Potable water is provided to the area by the Consolidated Waterworks District No. 1 of Terrebonne Parish and Lafourche Parish Water District 1.

6.2.3.10 Sewage Disposal System

Sewage disposal is provided to the area by the Consolidated Waterworks District No. 1 and Lafourche Parish District 1.

6.2.3.11 Other Conditions of Concern

A marked petroleum pipeline right-of-way was observed extending along Reach J-2, west of State Highway 665.

6.3 Exterior Observations

6.3.1 Section A

6.3.1.1 Hazardous Substances and Petroleum Products

Nuisance dumping consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, was observed in the central portion of the segment.

6.3.1.2 Storage Tanks

An approximate 250-gallon AST associated with an unnamed pumping station was observed in the northern portion of the segment.

An approximate 250-gallon AST was observed at a residence along an outfall canal associated with existing levee; an abandoned drum was observed in the canal adjacent to the AST.

Three fuel storage tanks ranging from approximately 250 gallons to 1,000 gallons were observed at Bob's Bayou Black Marina.

Multiple storage tanks including three bulk storage tanks approximately 100,000 gallons in size, containing crude oil; and several unidentified storage tanks ranging from approximately 500 gallons to 10,000 gallons in size; were observed on the property. Distillation columns, as well as several thousand linear feet of pipeline, were observed at the North Terrebonne Gas Plant.

Two high-pressure tanks approximately 5,000 and 10,000 gallons in size, four vertical storage tanks approximately 2,000 gallons in size, and several thousand linear feet of pipeline were observed at the Transcontinental Pipeline Company – Williams Facility.

Two approximate 1,000-gallon ASTs containing unknown product were observed at the Waterproof Ridge Farm located in the northern portion of the segment.

Two approximate 1,000-gallon ASTs were observed at the Falgout Canal Marina fueling station; at least two approximate 250-gallon ASTs were observed at the camps associated with the Falgout Canal Marina in the southern portion of the segment.

One approximate 1,000-gallon AST was observed at the Upper Bayou Dularge Pump Station located in the southern portion of the segment.

One approximate 5,000-gallon AST was observed at the Frogco Amphibious Equipment facility located at the southern terminus of Section A.

6.3.1.3 Odors

No odors were noted during the site inspection.

6.3.1.4 Pools of Liquids

No pools of liquids were observed during the inspection of the exterior areas of the segment.

6.3.1.5 Drums

An abandoned drum was observed at a residence in an outfall canal associated with the existing levee; an approximate 250-gallon AST was observed along the canal adjacent to the drum.

Approximately 26 steel and polycarbonate drums were observed at the Petro Quest Energy, LLC facility; three drums were observed buried under heavy brush approximately 100 feet northwest of this facility.

Six weathered, empty 55-gallon drums were observed in the vicinity of the proposed culvert in the central portion of the segment. No stained soils were observed in the area of the drums.

6.3.1.6 Unidentified Substance Containers

No unidentified substance containers were observed during the inspection of exterior areas of the segment.

6.3.1.7 PCBs

At least sixteen pole-mounted transformers were observed at the camps associated with the Falgout Canal Marina in the southern portion of the segment. No stains were observed on the ground beneath the pole-mounted transformers that were accessible.

6.3.1.8 Pits, Ponds, or Lagoons

Outfall canals were observed along the levee located in the southern portion of the segment.

6.3.1.9 Stained Soil or Pavement

No stained soils or pavement was observed during the inspection of the exterior areas of Section A.

6.3.1.10 Stressed Vegetation

No stressed vegetation was observed during the inspection of Section A.

6.3.1.11 Solid Waste

Nuisance dumping consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, was observed in the central portion of the segment.

6.3.1.12 Waste Water

No waste water discharges to or from the site were observed during the inspection of Section A; however, based on information reviewed as part of this investigation, the Falgout Canal Marina located within Section A is permitted to operate an in-ground, 2,000-gallon extended aeration waste water treatment system consisting of activated sludge with chlorination limited to discharges totaling 5,000 GPD.

6.3.1.13 Wells

No potable, irrigation, or industrial wells were observed during the inspection of the exterior areas of Section A.

6.3.1.14 Septic Systems

No septic systems were observed during the inspection of the exterior areas of Section A.

6.3.1.15 Other Conditions of Concern

No other conditions of concern were observed during the inspection of the exterior areas of Section A.

6.3.2 Section B

6.3.2.1 Hazardous Substances and Petroleum Products

Numerous five-gallon containers, labeled hydraulic oil and engine oil, were observed along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2. No stains were observed on the ground around the accessible containers.

6.3.2.2 Storage Tanks

An unlabeled, approximate 7,500-gallon AST, stored in a roofed, concrete secondary containment area, was observed outside a building without signage on Janet Lynn Drive within Reach E-2.

Six approximate 300,000-gallon ASTs were observed from the road at the Plains All American Pipeline-Cocodrie Station facility at 7394 State Highway 56 within Reach H-2.

An unlabeled, approximate 5,000-gallon AST was observed from the road within a fenced area at the Shell Pipeline Company Lake Barre Booster Station Dock within Reach H-1.

Three ASTs were observed stored at Cecil Lapeyrouse Grocery, 7243 Shoreline Drive, within the segment in Reach H-2. One approximate 1,500-gallon AST contained diesel. Two approximate 5,000-gallon ASTs contained unleaded gasoline. The tanks were stored on support structures on the gravel parking lot. This facility was located within Reach H-2.

An unlabeled, rusted, approximate 1,500-gallon AST was observed outside a building without signage on Shoreline Drive within Reach H-2.

An unlabeled, rusted, approximate 2,000-gallon AST was observed outside a building without signage on Driftwood Street within Reach H-2.

An unlabeled, approximate 7,500-gallon AST stored within a concrete vault was observed in the parking lot of the Lapeyrouse Seafood Bar and Grocery on Little Caillou Road (State Highway 56). The AST was stored in a concrete secondary containment structure adjoining a canal within Reach H-2.

An approximate 1,500-gallon AST containing diesel was observed at Sportsman’s Paradise, 6830 State Highway 56 (Little Caillou Road) within Reach H-3.

An approximate 1,000-gallon, unlabeled AST and an approximate 5,000-gallon, unlabeled AST were observed outside a building without signage on Little Caillou Road, within Reach H-3.

Three approximate 20,000-gallon ASTs, one with a diesel dispenser in front, and one labeled “regular” and an unlabeled 500-gallon AST were observed outside Madison Seafood at 2166 Highway 55 (Montegut Road) within Reach I-2.
Four approximate 7,500-gallon ASTs were observed from the road at a fenced Castex Energy, Inc. facility on State Highway 55 (Montegut Road), within Reach I-2.

One approximate 2,000-gallon AST for the Madison Pump Station was observed by helicopter on a levee, within Reach I-2.

6.3.2.3 Odors

No unusual odors were observed during the inspection of the exterior areas of Section B.

6.3.2.4 Pools of Liquids

No pools of liquids were observed during the inspection of the exterior areas of Section B.

6.3.2.5 Drums

Two 55-gallon drums were observed outside the Shell Pipeline Company Lake Barre Booster Station Dock within Reach H-1. The drums were labeled “heavy duty engine oil” and “oil.” No stains were observed on the ground in the vicinity of the drums.

6.3.2.6 Unidentified Substance Containers

No unidentified substance containers were observed during the inspection of the exterior areas of Section B.

6.3.2.7 PCBs

Numerous pole-mounted transformers were observed along roadways within Section B. No stains were observed on the ground beneath the pole-mounted transformers that were accessible.

6.3.2.8 Pits, Ponds, or Lagoons

No pits, ponds or lagoons were observed during the inspection of the exterior areas of Section B.

6.3.2.9 Stained Soil or Pavement

No stained soils or pavement was observed during the inspection of the exterior areas of Section B.

6.3.2.10 Stressed Vegetation

No stressed vegetation was observed during the inspection of the exterior areas of Section B.

6.3.2.11 Solid Waste

Dumped debris, *de minimis* in nature, was observed in the marsh along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2. No stains were observed around the debris that was accessible.

6.3.2.12 Waste Water

No waste water concerns were noted during the inspection of the exterior areas of Section B.

6.3.2.13 Septic Systems

Private properties were not inspected for septic systems.

6.3.2.14 Other Conditions of Concern

A marked petroleum pipeline was observed crossing Reach I-3, south of Point Barre Road, in an east-west direction across the segment.

6.3.3 Section C

6.3.3.1 Hazardous Substances and Petroleum Products

Discarded debris, consisting of household appliances, cabinetry, and household hazardous waste, totaling in aggregate less than 10 gallons, all of which appeared burned was observed in the Reaches J-1 and J-3. No stains were noted in the vicinity of the debris.

6.3.3.2 Storage Tanks

An approximate 1,500 gallon, abandoned AST was observed along the levee, within Reach K.

An unlabeled 55 gallon poly-drum was observed in the drainage canal near Island Road, within Reach J-3.

An approximate 2,000 gallon, diesel AST was observed outside a drainage canal pump station, within Reach J-1.

An approximate 500 gallon, diesel AST was observed outside a drainage canal pump station, within Reach J-3.
Two ASTs, approximately 10,000 gallons each in size, were observed outside a commercial fishing business, along State Highway 665 and Bayou Pointe aux Chenes, within Reach J-3.

Three diesel ASTs, approximately 500 gallons, 1,000 gallons, and 2,000 gallons in size, were observed outside a drainage canal pump station, within Reach L-3.

Three diesel ASTs, approximately 1,000 gallons and two 2,000 gallons in size, were observed in the Pointe Aux Chene Marina.

6.3.3.3 Odors

No odors were noted during the site inspection.

6.3.3.4 Pools of Liquids

No pools of liquids were observed during the inspection of the exterior areas of Section C.

6.3.3.5 Drums

Section C, Site 2, 29°25'53.76"N, 90°27'39.60"W, one unlabeled 55-gallon poly-drum was observed in the drainage canal near Island Road, within Reach J-3.

6.3.3.6 Unidentified Substance Containers

No unidentified substance containers were observed during the inspection of the exterior areas of Section C.

6.3.3.7 PCBs

Numerous pole-mounted transformers were observed along roadways within Section C. No stains were observed on the ground beneath the pole-mounted transformers that were accessible.

6.3.3.8 Pits, Ponds, or Lagoons

No pits, ponds or lagoons were observed during the inspection of the exterior areas of Section C.

6.3.3.9 Stained Soil or Pavement

No stained soils or pavement was observed during the inspection of the exterior areas of Section C.

6.3.3.10 Stressed Vegetation

No stressed vegetation was observed during the inspection of the exterior areas of Section C.

6.3.3.11 Solid Waste

Dumped debris was observed in the marsh and canal along Reach J-1 and J-3. No stains were observed around the debris that was accessible.

6.3.3.12 Waste Water

No waste water concerns were noted during the inspection of the exterior areas of Section C.

6.3.3.13 Septic Systems

Private properties were not inspected for septic systems.

6.3.3.14 Other Conditions of Concern

A marked petroleum pipeline right-of-way was observed extending along Reach J-2, west of State Highway 665.

7.0 INTERVIEWS

At the request of the client, AEROSTAR did not conduct interviews with site owners, managers, occupants, or other individuals familiar with the site, including local, state, tribal or federal agency representatives; however, an interview with the User following the X3 User Questionnaire found in Appendix X3 of ASTM E 1527-05 was performed as part of this investigation. A Copy of the interview questionnaire is included as Appendix E.

7.1 Interview with Site Owner

Interviews were not conducted with individual site owners as part of the scope of work.

7.2 Interview with Site Manager

Interviews were not conducted with individual site managers as part of the scope of work.

7.3 Interviews with Occupants

Interviews were not conducted with individual site occupants as part of the scope of work.

7.4 Interviews with Local Government Officials

Due to the information collected from the historical sources, AEROSTAR did not interview any local government officials to determine the historical uses of the site.

7.5 Interviews with Others

AEROSTAR interviewed Ms. Elaine Stark, USACE Project Manager and the User, concerning the subject site following User Questionnaire found in Appendix X3 of ASTM E 1527-05. A copy of the User Questionnaire is included in Appendix F. Ms. Stark stated that, to the best of her knowledge, there are no environmental liens or AULs against the properties contained within the site. Ms. Stark indicated that extensive research regarding the fair market value of property within the corridor has been undertaken and that no devaluation from fair market is necessary. She stated that she has no specialized knowledge of the subject site or the adjoining properties that had not already been provided to AEROSTAR. She indicated that, to the best of her knowledge, no spills or environmental cleanups have occurred within the subject corridor. Ms. Stark indicated that the Phase I ESA is being conducted as part of a revised programmatic EIS, whose findings will become a decision document for the Morganza, Louisiana to the Gulf of Mexico project objective.

No other interviews were conducted with other parties as part of the scope of work.

8.0 FINDINGS AND OPINIONS

8.1 Known or Suspect Recognized Environmental Conditions

8.1.1 Section A

The following known or suspect recognized environmental conditions were identified for Section A:

- Section A, Site 1 (29° 38' 33.90" N, 90° 57' 48.82” W): The facility is an off-site RCRA-SQG and AST facility identified in the LDEQ EDMS as containing large volumes of several hazardous materials or petroleum products; soil and groundwater sampling is on-going at the facility.

- Section A, Site 2 (29° 38' 15.9" N, 90° 57' 44.5" W): One approximate 250-gallon AST was observed at an unnamed pumping station.

- Section A, Site 3 (29° 37' 52" N, 90° 57' 1.4" W): An approximate 250-gallon AST was observed at a residence along an outfall canal associated with existing levee; an abandoned drum was observed in the canal adjacent to the AST.

- Section A, Site 4 (29° 37' 43.76" N, 90° 56' 40.39" W): Three fuel storage tanks ranging in size from approximately 250 gallons to 1,000 gallons were observed at Bob's Bayou Black Marina.

- Section A, Site 5 (29° 37' 44.52" N, 90° 56' 43.01” W): Approximately 26 steel and polycarbonate drums were observed at the Petro Quest Energy, LLC facility; three drums were observed buried under heavy brush approximately 100 feet northwest of this facility.

- Section A, Site 6 (29° 37' 46.29" N, 90° 55' 57.27” W): Multiple storage tanks, including three bulk storage tanks approximately 100,000 gallons in size containing crude oil; and several unidentified storage tanks ranging from approximately 500 gallons to 10,000 gallons in size; were observed on the property. Distillation columns, as well as several thousand linear feet of pipeline, were observed at this RCRA-LQG.

- Section A, Site 7 (29° 36' 8.11" N, 90° 52' 33.88” W): Two high-pressure tanks approximately 5,000 and 10,000 gallons in size, four vertical storage tanks approximately 2,000 gallons in size, and several thousand linear feet of pipeline were observed at this RCRA-CESQG and AST facility; groundwater and soil sampling is on-going based on an existing consent decree against the facility.

- Section A, Site 8 (29° 34' 54.31" N, 90° 49' 28.34” W): Two 5,000-gallon and two 1,000-gallon ASTs containing Avgas, gas, and diesel are listed for this facility.

- Section A, Site 9 (29° 32' 46.35" N, 90° 48' 3.81" W): An on-site concern was noted from the Waterproof Ridge Farm, an AST facility, located in the northern portion of the segment.

- Section A, Site 10 (29° 28' 51.60" N, 90° 45' 40.90” W): An on-site concern was noted from nuisance dumping consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, in the central portion of the segment.

- Section A, Site 11 (29° 27' 42.48" N, 90° 45' 49.49" W): An on-site concern was noted from six weathered, empty 55-gallon drums observed in the vicinity of a proposed culvert with sluice gates in the central portion of the segment.

- Section A, Site 12 (29° 25' 2.76" N, 90° 47' 3.56" W): An on-site concern was noted from the Upper Bayou Dularge Pump Station, an AST facility, located in the southern portion of the segment.

- Section A, Site 13 (29° 24' 47.95" N, 90° 47' 1.24" W): An on-site concern was noted from the Falgout Canal Marina, an AST facility, located in the southern portion of the segment.

- Section A, Site 14 (29° 24' 37.70" N, 90° 47' 13.21" W): An on-site concern was noted from an unlabeled, approximate 5,000-gallon AST observed outside the Frogco Amphibious Equipment facility. The AST appeared to be stored on the grass.

- Section A: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within Section A.

- Section A: Off-site concerns were noted from eight former and present oil and/or gas well locations identified within 500 feet of Section A (1,000 feet from the centerline of the alignment).

8.1.2 Section B

- Section B, Site 1 (29° 24' 36.41" N, 90° 47' 11.46" W). An on-site concern was noted from the presence of an approximate 5,000-gallon, unlabeled AST observed within a roofed, secondary containment area outside a building without signage on Janet Lynn Drive within Reach E-2.

- Section B, Site 2 (29° 17' 54.89" N, 90° 38' 58.85" W): An on-site concern was noted from six ASTs, approximately 300,000 gallons each, observed from the road at Plains All American Pipeline, Cocodrie Station, 7394 Highway 56, within Reach H-1. The facility is listed as a crude oil pipeline transportation facility.

- Section B, Site 3 (29° 17' 56.76" N, 90° 38' 55.55" W): An on-site concern was noted from an AST and two 55-gallon drums at the Shell Pipeline Company, LP, Lake Barre Booster Station Dock, within Reach H-1. The approximate 5,000-gallon AST was observed from the road and the 55-gallon drums, labeled heavy engine oil and oil, were observed adjoining the facility’s entrance.

- Section B, Site 4 (29° 18' 27.36" N, 90° 38' 50.55" W): An on-site concern was noted from three ASTs observed at Cecil Lapeyrouse Grocery, 7243 Shoreline Drive, within Reach H-2. One AST, approximately 1,500-gallons in size, contained diesel. Two ASTs, approximately 5,000 gallons each, contained unleaded gasoline. The tanks were stored on the gravel parking lot.

- Section B, Site 5 (29° 18' 37.93" N, 90° 38' 48.86" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled, rusted AST observed from the road outside a building without signage on Shoreline Drive, within Reach H-2.

- Section B, Site 6 (29° 19' 30.68" N, 90° 38' 38.38" W): An on-site concern was noted from an approximate 2,000-gallon, unlabeled, AST observed from the road at a building without signage in the southeastern quadrant of Riggio Street and Driftwood Street, within Reach H-2.

- Section B, Site 7 (29° 19' 58.90" N, 90° 38' 35.26" W): An on-site concern was noted from an approximate 7,500-gallon, unlabeled AST, stored inside a concrete vault, at the Lapeyrouse Seafood Bar and Grocery on Little Caillou Road, within Reach H-3.

- Section B, Site 8 (29° 20' 12.86" N, 90° 38' 20.44" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled AST observed at Sportsman's Paradise, 6830 Highway 56 (Little Caillou Road), within Reach H-3.

- Section B, Site 9 (29° 21' 12.07" N, 90° 37' 33.94" W): An on-site concern was noted from two unlabeled ASTs, approximately 1,000 and 5,000 gallons each in size, observed from the road outside a building without signage on Little Caillou Road, within Reach H-3.

- Section B, Site 10 (29° 23' 25.70" N, 90° 35' 13.59" W): An on-site concern was noted from three ASTs, labeled diesel and unleaded gasoline, approximately 20,000 gallons each in size, and an approximate 500-gallon, unlabeled AST observed outside Madison Seafood, 2166 Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 11 (29° 23' 46.92" N, 90° 35' 09.72" W): An on-site concern was noted from four, approximate 7,500-gallon, unlabeled ASTs observed from the road at the Castex Energy, Inc. facility on State Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 12 (29° 23' 59.69" N, 90° 35' 01.39" W): An on-site concern was noted from dumped debris observed in the marsh along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 13 (29° 24' 09.36" N, 90° 34' 55.43" W): An on-site concern was noted from numerous five-gallon containers, labeled hydraulic oil and engine oil, observed along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 14 (29° 24' 19.30" N, 90° 34' 29.38" W): An on-site concern was noted from an approximate 2,000-gallon AST for the Madison Pump Station, observed by helicopter on a levee, within Reach I-2.

- Section B, Site 15 (29° 25' 30.07" N, 90° 34' 01.75" W): An on-site concern was noted from a marked petroleum pipeline observed crossing State Highway 55 (Montegut Road), within Reach I-3.

- Section B, Site 16 (29° 18' 28.29" N, 90° 38' 49.44" W): An on-site concern was noted from Little Caillou Packing Company, identified as an Emergency Response Notification System (ERNS) facility, located at 7241 Shoreline Drive, within Reach H-2. A 600-gallon discharge of a petroleum product from a portable tank discharge line was reported at this facility on December 14, 1995. Database information indicates the leak was "secured;" however, no additional information was available concerning this incident.

- Section B, Site 17 (29° 20' 19.15" N, 90° 38' 13.71" W): An on-site concern was noted from an unnamed facility, identified as an ERNS facility, located at 6809 Highway 56, within Reach H-3. A transformer oil leak was reported at this address. No additional information was available about the incident.

- Section B, Site 18: An on-site concern was noted from a dump site previously identified along Falgout Canal Road in a September 1997 *Final Report for Hazardous, Toxic, and Radioactive*

(HTRW) Investigations that covered portions of the corridor. While the exact location of the dump site was not noted in the report, it was notated on a small scale map and appears to have been located within Reaches E-1 or E-2. At the time of the 1997 assessment, the dump consisted of automobile tires, metal and wood construction debris, six, unlabeled, empty 55-gallon drums, several, empty five-gallon containers, and some areas of distressed vegetation and stained soil. AEROSTAR did not locate this dump during the current site investigation.

- Section B, Site 19 (29° 20' 08.58" N, 90° 38' 29.07" W): An off-site concern was noted from several large ASTs, approximately 50,000 gallons each in size, observed from the road at the Castex Energy, Inc., Lapeyrouse Commingling Facility on 6848 State Highway 56 (Little Caillou Road), adjoining Reach H-3 to the north.

- Section B: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within the Section B segment (500 feet from the centerline of the alignment).

- Section B: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section B segment (1,000 feet from the centerline of the alignment).

- Section B: On-site concerns were noted from 19 pipeline permits identified within the Section B segment (500 feet from the centerline of the alignment).

8.1.3 Section C

- Section C, Site 1 (29° 25 '20.64" N, 90° 26' 47.76" W): An on-site concern was noted from an approximate 1,500-gallon, abandoned AST observed along the levee, within Reach K.

- Section C, Site 2 (29° 25' 53.76" N, 90° 27' 39.60" W): An on-site concern was noted from an unlabeled 55-gallon poly-drum observed in the drainage canal near Island Road, within Reach J-3.

- Section C, Site 3 (29° 25' 59.17" N, 90° 27' 38.54" W): An on-site concern was noted from an approximate 2,000-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-1.

- Section C, Site 4 (29° 25' 29.27" N, 90° 27' 15.17" W): An on-site concern was noted from an approximate 500-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-3.

- Section C, Site 5 (29° 25' 41.91" N, 90° 27' 21.94" W): An on-site concern was noted from two ASTs, approximately 10,000 gallons each in size, observed outside a commercial fishing business, along State Highway 665 and Bayou Pointe aux Chenes, within Reach J-3.

- Section C, Site 6 (29° 30' 55.10" N, 90° 22' 30.86" W): An on-site concern was noted from three diesel ASTs, approximately 500 gallons, 1,000 gallons, and 2,000 gallons in size, observed outside a drainage canal pump station, within Reach L-3.

- Section C, Site 7 (29° 24' 59.60" N, 90° 26' 51.62" W): An on-site concern was noted from three diesel ASTs, approximately 1,000 gallons and two 2,000 gallons in size, observed in the Pointe Aux Chene Marina.

- Section C, Site 8 (29° 25' 56.46" N, 90° 27' 40.24" W): An on-site concern was noted from a marked petroleum pipeline observed extending northwest to southeast, within Reach J-1 and J-3.

- Section C: On-site concerns were noted from 14 former and present oil and/or gas well locations identified within the Section C segment.

- Section C: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section C segment (1,000 feet from the centerline of the alignment).

- Section C: On-site concerns were noted from 15 pipeline permits identified within the Section C segment (500 feet from the centerline of the alignment).

8.2 Historical Recognized Environmental Conditions

8.2.1 Section A

No historical recognized environmental conditions were noted in connection with the site.

8.2.2 Section B

No historical recognized environmental conditions were noted in connection with the site.

8.2.3 Section C

No historical recognized environmental conditions were noted in connection with the site.

8.3 *De Minimis* Conditions

8.3.1 Section A

No *de minimis* conditions were noted in connection with the site.

8.3.2 Section B

No *de minimis* conditions were noted in connection with the site.

8.3.3 Section C

No *de minimis* conditions were noted in connection with the site.

9.0 CONCLUSIONS

AEROSTAR has performed a Phase I ESA in conformance with the scope and limitations of ASTM Standard E 1527-05 of Morganza, Louisiana to the Gulf of Mexico, located in Terrebonne and Lafourche Parishes, Louisiana. Any exceptions to, or deletions from, this practice are described in Section 2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the site, except for the following:

- Section A, Site 1 (29° 38' 33.90" N, 90° 57' 48.82” W): The facility is an off-site RCRA-SQG and AST facility identified in the LDEQ EDMS as containing large volumes of several hazardous materials or petroleum products; soil and groundwater sampling is on-going at the facility.

- Section A, Site 2 (29° 38' 15.9" N, 90° 57' 44.5" W): One approximate 250-gallon AST was observed at an unnamed pumping station.

- Section A, Site 3 (29° 37' 52" N, 90° 57' 1.4" W): An approximate 250-gallon AST was observed at a residence along an outfall canal associated with existing levee; an abandoned drum was observed in the canal adjacent to the AST.

- Section A, Site 4 (29° 37' 43.76" N, 90° 56' 40.39" W): Three fuel storage tanks ranging in size from approximately 250 gallons to 1,000 gallons were observed at Bob’s Bayou Black Marina.

- Section A, Site 5 (29° 37' 44.52" N, 90° 56' 43.01” W): Approximately 26 steel and polycarbonate drums were observed at the Petro Quest Energy, LLC facility; three drums were observed buried under heavy brush approximately 100 feet northwest of this facility.

- Section A, Site 6 (29° 37' 46.29" N, 90° 55' 57.27” W): Multiple storage tanks, including three bulk storage tanks approximately 100,000 gallons in size containing crude oil; and several unidentified storage tanks ranging from approximately 500 gallons to 10,000 gallons in size; were observed on the property. Distillation columns, as well as several thousand linear feet of pipeline, were observed at this RCRA-LQG.

- Section A, Site 7 (29° 36' 8.11" N, 90° 52' 33.88” W): Two high-pressure tanks approximately 5,000 and 10,000 gallons in size, four vertical storage tanks approximately 2,000 gallons in size, and several thousand linear feet of pipeline were observed at this RCRA-CESQG and AST facility; groundwater and soil sampling is on-going based on an existing consent decree against the facility.

- Section A, Site 8 (29° 34' 54.31" N, 90° 49' 28.34” W): Two 5,000-gallon and two 1,000-gallon ASTs containing Avgas, gas, and diesel are listed for this facility.

- Section A, Site 9 (29° 32' 46.35" N, 90° 48' 3.81" W): An on-site concern was noted from the Waterproof Ridge Farm, an AST facility, located in the northern portion of the segment.

- Section A, Site 10 (29° 28' 51.60" N, 90° 45' 40.90” W): An on-site concern was noted from nuisance dumping consisting of household appliances, cabinetry, a 55-gallon drum, and paint and household cleaners, totaling in aggregate less than 10 gallons, which appeared to have been burned, in the central portion of the segment.

- Section A, Site 11 (29° 27' 42.48" N, 90° 45' 49.49" W): An on-site concern was noted from six weathered, empty 55-gallon drums observed in the vicinity of a proposed culvert with sluice gates in the central portion of the segment.

- Section A, Site 12 (29° 25' 2.76" N, 90° 47' 3.56" W): An on-site concern was noted from the Upper Bayou Dularge Pump Station, an AST facility, located in the southern portion of the segment.

- Section A, Site 13 (29° 24' 47.95" N, 90° 47' 1.24" W): An on-site concern was noted from the Falgout Canal Marina, an AST facility, located in the southern portion of the segment.

- Section A, Site 14 (29° 24' 37.70" N, 90° 47' 13.21" W): An on-site concern was noted from an unlabeled, approximate 5,000-gallon AST observed outside the Frogco Amphibious Equipment facility. The AST appeared to be stored on the grass.

- Section A: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within Section A.

- Section A: Off-site concerns were noted from eight former and present oil and/or gas well locations identified within 500 feet of Section A (1,000 feet from the centerline of the alignment).

- Section B, Site 1 (29° 24' 36.41" N, 90° 47' 11.46" W): An on-site concern was noted from the presence of an approximate 5,000-gallon, unlabeled AST observed within a roofed, secondary containment area outside a building without signage on Janet Lynn Drive within Reach E-2.

- Section B, Site 2 (29° 17' 54.89" N, 90° 38' 58.85" W): An on-site concern was noted from six ASTs, approximately 300,000 gallons each, observed from the road at Plains All American Pipeline, Cocodrie Station, 7394 Highway 56, within Reach H-1. The facility is listed as a crude oil pipeline transportation facility.

- Section B, Site 3 (29° 17' 56.76" N, 90° 38' 55.55" W): An on-site concern was noted from an AST and two 55-gallon drums at the Shell Pipeline Company, LP, Lake Barre Booster Station Dock, within Reach H-1. The approximate 5,000-gallon AST was observed from the road and the 55-gallon drums, labeled heavy engine oil and oil, were observed adjoining the facility's entrance.

- Section B, Site 4 (29° 18' 27.36" N, 90° 38' 50.55" W): An on-site concern was noted from three ASTs observed at Cecil Lapeyrouse Grocery, 7243 Shoreline Drive, within Reach H-2. One AST, approximately 1,500-gallons in size, contained diesel. Two ASTs, approximately 5,000 gallons each, contained unleaded gasoline. The tanks were stored on the gravel parking lot.

- Section B, Site 5 (29° 18' 37.93" N, 90° 38' 48.86" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled, rusted AST observed from the road outside a building without signage on Shoreline Drive, within Reach H-2.

- Section B, Site 6 (29° 19' 30.68" N, 90° 38' 38.38" W): An on-site concern was noted from an approximate 2,000-gallon, unlabeled, AST observed from the road at a building without signage in the southeastern quadrant of Riggio Street and Driftwood Street, within Reach H-2.

- Section B, Site 7 (29° 19' 58.90" N, 90° 38' 35.26" W): An on-site concern was noted from an approximate 7,500-gallon, unlabeled AST, stored inside a concrete vault, at the Lapeyrouse Seafood Bar and Grocery on Little Caillou Road, within Reach H-3.

- Section B, Site 8 (29° 20' 12.86" N, 90° 38' 20.44" W): An on-site concern was noted from an approximate 1,500-gallon, unlabeled AST observed at Sportsman's Paradise, 6830 Highway 56 (Little Caillou Road), within Reach H-3.

- Section B, Site 9 (29° 21' 12.07" N, 90° 37' 33.94" W): An on-site concern was noted from two unlabeled ASTs, approximately 1,000 and 5,000 gallons each in size, observed from the road outside a building without signage on Little Caillou Road, within Reach H-3.

- Section B, Site 10 (29° 23' 25.70" N, 90° 35' 13.59" W): An on-site concern was noted from three ASTs, labeled diesel and unleaded gasoline, approximately 20,000 gallons each in size, and an approximate 500-gallon, unlabeled AST observed outside Madison Seafood, 2166 Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 11 (29° 23' 46.92" N, 90° 35' 09.72" W): An on-site concern was noted from four, approximate 7,500-gallon, unlabeled ASTs observed from the road at the Castex Energy, Inc. facility on State Highway 55 (Montegut Road), within Reach I-2.

- Section B, Site 12 (29° 23' 59.69" N, 90° 35' 01.39" W): An on-site concern was noted from dumped debris observed in the marsh along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 13 (29° 24' 09.36" N, 90° 34' 55.43" W): An on-site concern was noted from numerous five-gallon containers, labeled hydraulic oil and engine oil, observed along State Highway 55 (Montegut Road) and Bayou Terrebonne, within Reach I-2.

- Section B, Site 14 (29° 24' 19.30" N, 90° 34' 29.38" W): An on-site concern was noted from an approximate 2,000-gallon AST for the Madison Pump Station, observed by helicopter on a levee, within Reach I-2.

- Section B, Site 15 (29° 25' 30.07" N, 90° 34' 01.75" W): An on-site concern was noted from a marked petroleum pipeline observed crossing State Highway 55 (Montegut Road), within Reach I-3.

- Section B, Site 16 (29° 18' 28.29" N, 90° 38' 49.44" W): An on-site concern was noted from Little Caillou Packing Company, identified as an Emergency Response Notification System (ERNS) facility, located at 7241 Shoreline Drive, within Reach H-2. A 600-gallon discharge of a petroleum product from a portable tank discharge line was reported at this facility on December 14, 1995. Database information indicates the leak was "secured;" however, no additional information was available concerning this incident.

- Section B, Site 17 (29° 20' 19.15" N, 90° 38' 13.71" W): An on-site concern was noted from an unnamed facility, identified as an ERNS facility, located at 6809 Highway 56, within Reach H-3. A transformer oil leak was reported at this address. No additional information was available about the incident.

- Section B, Site 18: An on-site concern was noted from a dump site previously identified along Falgout Canal Road in a September 1997 *Final Report for Hazardous, Toxic, and Radioactive*

(HTRW) Investigations that covered portions of the corridor. While the exact location of the dump site was not noted in the report, it was notated on a small scale map and appears to have been located within Reaches E-1 or E-2. At the time of the 1997 assessment, the dump consisted of automobile tires, metal and wood construction debris, six, unlabeled, empty 55-gallon drums, several, empty five-gallon containers, and some areas of distressed vegetation and stained soil. AEROSTAR did not locate this dump during the current site investigation.

- Section B, Site 19 (29° 20' 08.58" N, 90° 38' 29.07" W): An off-site concern was noted from several large ASTs, approximately 50,000 gallons each in size, observed from the road at the Castex Energy, Inc., Lapeyrouse Commingling Facility on 6848 State Highway 56 (Little Caillou Road), adjoining Reach H-3 to the north.

- Section B: On-site concerns were noted from 17 former and present oil and/or gas well locations identified within the Section B segment (500 feet from the centerline of the alignment).

- Section B: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section B segment (1,000 feet from the centerline of the alignment).

- Section B: On-site concerns were noted from 19 pipeline permits identified within the Section B segment (500 feet from the centerline of the alignment).

- Section C, Site 1 (29° 25 '20.64" N, 90° 26' 47.76" W): An on-site concern was noted from an approximate 1,500-gallon, abandoned AST observed along the levee, within Reach K.

- Section C, Site 2 (29° 25' 53.76" N, 90° 27' 39.60" W): An on-site concern was noted from an unlabeled 55-gallon poly-drum observed in the drainage canal near Island Road, within Reach J-3.

- Section C, Site 3 (29° 25' 59.17" N, 90° 27' 38.54" W): An on-site concern was noted from an approximate 2,000-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-1.

- Section C, Site 4 (29° 25' 29.27" N, 90° 27' 15.17" W): An on-site concern was noted from an approximate 500-gallon, diesel AST observed outside a drainage canal pump station, within Reach J-3.

- Section C, Site 5 (29° 25' 41.91" N, 90° 27' 21.94" W): An on-site concern was noted from two ASTs, approximately 10,000 gallons each in size, observed outside a commercial fishing business, along State Highway 665 and Bayou Pointe aux Chenes, within Reach J-3.

- Section C, Site 6 (29° 30' 55.10" N, 90° 22' 30.86" W): An on-site concern was noted from three diesel ASTs, approximately 500 gallons, 1,000 gallons, and 2,000 gallons in size, observed outside a drainage canal pump station, within Reach L-3.

- Section C, Site 7 (29° 24' 59.60" N, 90° 26' 51.62" W): An on-site concern was noted from three diesel ASTs, approximately 1,000 gallons and two 2,000 gallons in size, observed in the Pointe Aux Chene Marina.

- Section C, Site 8 (29° 25' 56.46" N, 90° 27' 40.24" W): An on-site concern was noted from a marked petroleum pipeline observed extending northwest to southeast, within Reach J-1 and J-3.

- Section C: On-site concerns were noted from 14 former and present oil and/or gas well locations identified within the Section C segment.

- Section C: Off-site concerns were noted from 19 former and present oil and/or gas well locations identified within 500 feet of the Section C segment (1,000 feet from the centerline of the alignment).

- Section C: On-site concerns were noted from 15 pipeline permits identified within the Section C segment (500 feet from the centerline of the alignment).

10.0 DEVIATIONS

AEROSTAR prepared this Phase I ESA in accordance with ASTM Standard E 1527-05.

11.0 ADDITIONAL SERVICES

Under the terms of the agreement between Client and AEROSTAR, no additional services were provided in association with the Phase I ESA. There may be environmental issues or conditions at a site that the Client may wish to assess in connection with commercial real estate that are outside the scope of this practice (the non-scope considerations). No implication is intended as to the relative importance of inquiry into such non-scope considerations, and this list of non-scope considerations is not intended to be all inclusive: asbestos-containing materials; radon; lead-based paint; lead in drinking water; wetlands; regulatory compliance; cultural and historical resources; industrial hygiene; health and safety; ecological resources; endangered species; indoor air quality; and high voltage power lines.

12.0 REFERENCES

References reviewed during the Phase I ESA are documented in Appendix E.

13.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

This is to certify the Phase I ESA Report of Morganza, Louisiana to the Gulf of Mexico, located in Terrebonne and Lafourche Parishes, Louisiana, has been examined by the undersigned.

DATE: 5/3/11

SIGNATURE: for
Christopher Whitehead
Project Chemist

DATE: 5/3/11

SIGNATURE:
K. Dawn Blackledge, P.G.
Senior Project Manager

14.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

This assessment was completed by Christopher Whitehead, Project Chemist, and reviewed by K. Dawn Blackledge, P.G., Senior Project Manager, all employees of AEROSTAR. We declare that, to the best of our professional knowledge, we meet the definition of environmental professional as defined in § 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess the property of a nature, history, and setting of the site. We have developed and performed the all appropriate inquiries in conformance with the standards set forth on 40 CFR Part 312. Qualifications of personnel participating in this assessment are provided in Appendix G.

Appendix M

DRAFT RECORD OF DECISION

DRAFT RECORD OF DECISION

Mississippi River and Tributaries,
Morganza, Louisiana, to the Gulf of Mexico
Risk Reduction System

The Final Revised Morganza to the Gulf of Mexico, Louisiana, Programmatic Environmental Impact Statement (RPEIS), dated May 2013, was prepared in support of the Morganza to the Gulf of Mexico, Louisiana, Post Authorization Change (PAC) Report dated May 2013. Because of the loss of life and damage caused by Hurricanes Katrina and Rita in 2005, the USACE has made changes and improvements in the planning, design, construction, operation, and maintenance of hurricane risk reduction projects to prevent future disasters to the greatest extent possible. Based on the review of these reports, the reviews of other Federal, state, and local agencies, input from the public, and the review by my staff, I find the plan recommended by the Chief of Engineers to be technically feasible, economically and environmentally justified, cost effective, in accordance with environmental statutes, and in the public interest.

The PAC Report was prepared due to changes in hurricane levee design standards and other changes, since the project authorization, that caused the Morganza to the Gulf project to exceed the 20 Percent cost increase limit specified in WRDA 1986, Section 902. The PAC Report primarily focuses on analysis of two levels of risk reduction (pre- and post-Hurricane Katrina "100-year" designs) along the authorized alignment. The PAC Report includes discussions on post-Katrina design criteria, project designs and costs, and economic analysis necessary for plan selection. The PAC Report describes all changes to the Morganza project since the 2002 Feasibility Report.

The Final RPEIS evaluates various alternatives, as authorized in House Resolution, Docket 2376, April 30, 1992, and WRDA 96 (PL 104-303, Sec 425), to reduce the risk of damages caused by hurricanes and storms for the communities located within the levee system. The risk reduction system consists of a levee system which includes floodgates on navigable waterways, water control structures, road gates and the HNC lock complex. Three alternatives were evaluated in detail for comparison and plan selection.

- The No Action Alternative is a requirement of the NEPA regulations. Under the no action alternative, the TLCD would continue to operate the forced drainage and partial hurricane risk reduction system that currently exists. The existing system contains segments and components, including ring levees, pump stations, and flood gates.
- The 1% Annual Exceedance Probability Storm Surge Risk Reduction System (1% AEP Alternative)—Recommended Plan and environmentally preferred plan consists of 98 miles of levee system which includes 22 floodgates on navigable waterways, 23 water control structures, nine road gates and the HNC lock complex.
- The 3% Annual Exceedance Probability Storm Surge Risk Reduction System (3% AEP Alternative) would consist of a similar alignment and structures as the 1% AEP alternative but with lower elevations.

The 1% AEP has been selected as the Recommended Plan because it has higher net benefits, lower residual risk and is more adaptable. As the Recommended Plan the 1% AEP Alternative provides risk reduction for water levels that have a 1 percent chance of occurring each year.

Although the RPEIS is programmatic in nature, some features of the action alternatives have sufficiently detailed designs to be fully assessed in the RPEIS, and would not require additional NEPA documentation. These features, termed "Constructible Features", include levee reaches F1, F2, G1; the HNC Lock Complex; and the Bayou Grand Caillou Floodgate. The remaining features are "Programmatic Features" and require additional NEPA documentation.

The Draft RPEIS and PAC were circulated for public review on 04 January 2013. One public meeting was conducted as an opportunity for the public, resource agencies, and elected officials to provide input regarding the proposed risk reduction system and provide comments. The public meeting was held on 31 January 2013 in Houma, LA. All comments and responses to those comments are included in the final RPEIS.

The final RPEIS includes a mitigation plan to fully compensate for direct and indirect wetland impacts associated with the Constructible Features of the Recommended Plan. The wetland mitigation plan includes restoration of 394 acres of intermediate marsh, 358 acres of brackish marsh, and 883 acres of saline marsh, although these acreages may be adjusted somewhat during Preconstruction Engineering Design. Construction of these mitigation features would be implemented concurrent with the initiation of construction of the Constructible Features of the Recommended Plan. To the extent practicable, initial mitigation construction activities would be completed within 18 months of the start of mitigation construction activities.

The environmental Justice analysis identified the communities of Gibson, Bayou Dularge, Dulac, and Isle de Jean Charles as EJ communities based on percent minority and/or low-income. The USACE has assumed the worst-case compensation scenario for the impacted communities outside of the project alignment. Should this scenario prove to be the appropriate mitigation method, at least 2,500 people would need to be relocated to areas behind the Federal protection system through 100% buy-out and uniform relocation assistance. In order to minimize any other potential disproportionate impacts resulting from construction of the levee alignment, additional analysis and outreach to these communities would be conducted and documented in supplemental NEPA reports.

The USACE will continue government-to-government consultation with federally-recognized Tribes on the potential of the proposed project to significantly affect protected tribal resources, tribal rights, and/or Indian lands.

Through consultation with SHPO, federally-recognized Tribes, and other consulting parties, as appropriate, the USACE will negotiate a programmatic agreement. Compliance with the procedures established by the approved programmatic agreement will satisfy the USACE's section 106 responsibilities.

All practicable means to avoid or minimize adverse environmental effects have been incorporated into the Recommended Plan. Technical and economic criteria used in the formulation of alternative plans were those specified in the Water Resource Council’s Principles and Guidelines. All applicable laws, executive orders, regulations and local government plans were considered in the evaluation of alternatives. The public will be best served by implementing the Recommended Plan as described in the Final RPEIS and PAC. The Final RPEIS was filed with the Environmental Protection Agency on Date (ERP No. F- COE-XXXXXX-LA). The purpose of this Record of Decision is to complete the procedural requirements of the National Environmental Policy Act process.

Draft

Date

Jo Ellen Darcy
Assistant Secretary of the Army