

**SOUTHEAST LOUISIANA
URBAN FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS**

SECTION 533(D) REPORT

VOLUME 2

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US Army Corps of Engineers
BUILDING STRONG®

**SOUTHEAST LOUISIANA
URBAN FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS**

SECTION 533(D) REPORT

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**SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

**APPENDIX A
ECONOMICS**

ECONOMICS APPENDIX
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SECTION I - INTRODUCTION

General. The Southeast Louisiana (SELA) Project was authorized by Section 108 of the Fiscal Year 1996 Appropriations Act. Its purpose was to reduce flood damages in Jefferson, Orleans, and St. Tammany Parishes caused by excessive rainfall. This study is being conducted as a Section 533(d) report and will investigate the feasibility of additional flood risk management alternatives for the W-14 Main Diversion Canal Basin. An economic evaluation of the improvements being considered is presented in this appendix. It was prepared in accordance with Engineering Regulation (ER) 1105-2-100 and ER 1105-2-101, Planning Guidance. The National Economic Development Procedures Manual for Urban Flood Damage, prepared by the Water Resources Support Center, Institute for Water Resources, was used as a reference.

The national planning objective, as defined by the “Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies” of the U.S. Water Resources Council, is to contribute to the national economic development consistent with protecting the Nation's environment, in accordance with national environmental statutes, applicable executive orders, and other national planning requirements. While the Principles and Guidelines require formulation of a plan that reasonably maximizes net national economic development benefits, consistent with the national objective, with the plan to be identified as the national economic development (NED) plan, Southeast Louisiana’s (SELA) authorization requires only that the plan be shown to be technically sound, environmentally acceptable, and economically feasible. The plan formulation process used for this study underwent two separate NED analyses, one for the structural plan and another for the non-structural plan, but did not optimize among alternative plans; rather, the project delivery team sought to develop a technically sound, economically viable project consistent with legislative directive and protecting the Nation’s environment. As previously mentioned in this report, Section 108 of the Energy and Water Development Appropriations Act of 1996 and Section 533 of WRDA 1996, as amended, provide a general and continuing authorization for engineering, design, and construction of SELA projects in Jefferson, Orleans, and St. Tammany Parishes. Accordingly, any work within the W-14 Canal basin of St. Tammany Parish that is determined to be in accordance with the St. Tammany Parish, Louisiana, Reconnaissance Report, July 1996, can be implemented under the existing SELA authority once a determination has been made that the conditions precedent to implementation, as required by Section 533(d) of WRDA 1996, have been met. In addition, optimization of NED plan through extensive alternatives analysis is neither required, nor included. An evaluation of the performance of a nonstructural alternative, that assumes the highest possible participation rate of 100 percent for a structure-raising alternative, was nonetheless included for purposes of comparison.

The evaluation consists of a description of the methodology used to determine economic damages and benefits under existing conditions, project costs, and benefit-to-cost analysis. October 2011 price levels were used in the evaluation. The proposed improvements (see Plan Formulation) were evaluated by comparing estimated average or expected annual benefits that would accrue to the study area with estimated average or expected annual project costs. Benefits were converted to expected annual values by using a Federal discount rate of 4.0 percent and a project life of 50 years. The estimated project base year (the year in which significant benefits will accrue as a result of project construction) is the year 2017.

National Economic Development Benefits Considered. The National Economic Development (NED) Procedures Manual for Urban Flood Damage recognizes four primary categories of benefits for urban flood control plans: inundation reduction, intensification, location, and employment benefits. Inundation reduction is the only category of benefits for urban areas considered in this analysis. This category includes damages to residential and non-residential structures, losses to the contents in these structures, and damages to privately owned vehicles. The evaluation process involved the formulation and assessment of the flood control improvements, the identification of categories of possible flood control benefits, the determination of without- and with-project damages and costs incurred, and the standard benefit-cost and net benefit comparisons. The basic economic evaluation included the comparison of the urban flood damage setting for the without-project and with-project conditions. Without project conditions including any SELA authorized project improvements reflect conditions expected to prevail in the absence of any alternative plan of improvement. With-project conditions reflect conditions in the project area with the proposed additional flood improvements in place.

SECTION II – DESCRIPTION OF THE STUDY AREA

Geographic Location. The project area is located within the City of Slidell, which is located in St. Tammany Parish, Louisiana on the Northeast bank of Lake Pontchartrain. The study is bounded on the west by Highway 11 and Spanish Trails Rd on the south. The east boundary is slightly to the east of I-10 following it up until Brown Switch Rd. There is also a small portion of the study area that is north of Brown Switch Rd. encompassing communities between Highway 1091 and Highway 11. A comprehensive field survey was conducted to identify every structure in the study area. The study area was divided into 21 reaches (see Figure 1). Within those reaches there are an estimated 819 non-residential structures, 91 mobile homes, 6,065 residential structures and 6,975 automobiles.

Demographics. The latest population data, displayed in Table 1, from the U.S Census Bureau estimates that there are approximately 27,000 people residing within the City of Slidell as of 2010, which increased from 25,700 in 2000. According to the 2010 Census, the average household size of Slidell is 2.66. Using this estimate, the approximate population of the study for the existing conditions (2010) would be approximately 16,375 and is projected to be 17,620 in the future condition year of 2066. The median household income (Table 2) increased from \$42,900 in 1999 to \$50,675 according to the 2005-2009 American survey. Additionally, the City of Slidell labor force (Table 3) rose slightly to 12,500 (2005-2009 American Survey) from 12,000 in 2000

Future Development. Because the population in the study area is expected to grow during the next 50 years, a projection was made of the future residential and non-residential development to take place in the area. Based on historical and economic trends, a total of 468 structures were placed on the undeveloped land within the reaches of the study area as part of the future condition structure inventory (2066). In determining future development the concept of urban sprawl was taken into account as well as the limited available and developable land within the study area. These structures were placed 0.5 foot above the current 100-year base flood elevation as required by FEMA. The value of the residential and non-residential structures that was added to the future condition inventory was based on the average depreciated replacement cost of the existing structures in the study area.

SECTION III – RECENT FLOOD HISTORY

Structural Flood Damage Claims. Table 4 summarizes the number of damage claims in City of Slidell between 1978 and 2010 as reported by the Federal Emergency Management Administration (FEMA). As noted in the table, the values reported are the sum of nominal annual dollars; the current replacement cost of these damages would be significantly higher than the figures shown due to the rising costs between 1978 and 2010. Approximately 8,600 claims were filed between 1978 and 2010 totaling \$430 million with an average of \$50,000 per claim.

SECTION IV – CONSTRUCTION ALTERNATIVE CONSIDERED

Problem Description. The City of Slidell, Louisiana, Southeast Louisiana Flood Risk Management Project (Slidell-SELA) is located in southeast Louisiana and is encompassed by the W-14 Main Diversion Canal Basin within the City of Slidell. This drainage basin experiences significant rainfall flooding. Extensive damage to homes and businesses in the affected area has resulted from past flooding events. The SELA Project authorized improvements to the W-14 Drainage Canal within the City Limits of Slidell. The proposed action is located north of Lake Pontchartrain in St. Tammany Parish,

approximately forty minutes from New Orleans, LA, along the W-14 Canal drainage basin which is south of Interstate Highway 12 and west of Interstate Highway 10. The construction alternative evaluated consists of the improvement of 4.1 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, clearing and snagging portions of the W-14 Canal, construction of a detention pond, expanding an existing pond, constructing overflow weirs, installing culverts, and relocating an existing bridge.

SECTION V – INUNDATION REDUCTION BENEFITS FOR STRUCTURES AND AUTOMOBILES

Flood Damage Reduction. Most of the benefits that accrue from a project are the result of reducing physical flood damages. Physical inundation damages include structural damages to buildings and losses to contents and losses to personal property such as automobiles. In determining potential flood damages for this area, flood damages were evaluated for urban structures, their contents and automobiles.

Analysis of Flood Damages to Structures. In the initiation of urban flood damage analyses, field investigations were conducted and data were collected to identify the extent and character of flooding in the project area. The determination of existing urban flood damages was based on the integration of stage-damage relationships and flood frequency distributions to structures located in the area. Development of the existing structure data was based upon a comprehensive field survey of all non-residential and residential structures located within the alignment of the project area. Site-specific depth- damage curves were used to depict the relationships between the depth of flooding and the structures contents damaged at various foot intervals of flooding. These curves are the basis for the damage/benefit analysis in evaluating project alternatives.

Structure Inventory and Valuation. The study area surveyed is located in St. Tammany Parish. A comprehensive field survey was conducted to identify every structure at risk in the study area. The purpose of the inventory was to collect pertinent information on all residential and non-residential structures within the project area. Within the project area there were 21 reaches identified (see Figure 1). Within those reaches there were 819 non-residential structures totaling \$602 million with the average structure worth \$679,000; 91 mobile homes totaling \$2.1 million with the average structure worth \$23,000; and, 6,065 residential structures totaling \$789 million with the average structure worth \$115,000. The field surveys estimated the value and elevation of all structures. Ground elevations were determined using Light Detection and Ranging (LIDAR) information provided by St. Tammany Parish. First floor elevations were estimated using a hand level to insure accuracy.

Both non-residential and residential structures were surveyed for pertinent characteristics. These included the type of structure, number of stories, type of foundation and construction, structure dimensions, physical condition of the structure, and the location. Structures were differentiated by 11 basic types -- residential one-story, residential two-story, mobile home, apartment or duplex, professional, retail and personal services, warehouses and contractor services, public and semi-public, eating and recreation, groceries and gas stations, and repairs and home use.

Residential and non-residential structure values were calculated using the Marshall and Swift (M&S) Residential Estimator Program. This continuously price-adjusted computer program uses cost per square foot, geographically localized by zip code, to calculate a depreciated replacement value for each structure. Mobile homes within the area were assessed using an average value per structure based on size.

Automobile Valuation. Based on 2000 Census block group data for the evaluation area, it was determined that each household (owner occupied housing or rental unit) owns an average of 1.8 vehicles. For automobile flood damage calculations, it was assumed that every automobile would be placed at the ground elevation associated with any given structure. The average value per automobile expressed in October 2011 price levels is \$13,548 based on the Manheim Used Vehicle Index. This index is based on all completed sales transactions at Manheim's US auctions. This is a sample size of over four million transactions annually. This index uses the twenty J.D. Power and Associates market classes and makes adjustments for differences in mileage alone, an unchanging mix of units sold, and seasonality. Manheim Auctions conducts over 80 used vehicle auctions throughout the United States and has been in operation for over 50 years.

Depth-Damage Relationships and Content-to-Structure Value Ratio (CSVSR). Depth-damage relationships define the relationship between the depth of flooding and the percent of damage at varying depths that occurs to structures and contents. These mathematical functions are used to quantify the flood damages to a given structure. The content-to-structure value ratio (CSVSR) is expressed as a ratio of two values: the depreciated replacement cost of contents and the depreciated replacement cost of the structure. One method to derive these relationships is the "Expert Opinion" method described in the Handbook of Forecasting Techniques, IWR Contract Report 75-7, December 1975 and Handbook of Forecasting Techniques, Part II, Description of 31 Techniques, Supplement to IWR Contract Report 75-7, August 1977. A panel of experts was convened to develop site-specific depth-damage relationships and CSVRS for feasibility studies associated with Jefferson and Orleans Parishes. Professionals in the fields of residential and non-residential construction, general contractors, insurance claims adjusters with experience in flood damage, and a certified restoration expert were

selected to sit on the panel. The panel was tasked with developing an array of residential and non-residential structure and content types. Residential structure types were divided into one-story on pier, one-story on slab, two-story on pier, two-story on slab and mobile homes. Non-residential structure types were categorized as metal-frame walls, masonry bearing walls, and wood or steel frame walls. Residential contents were evaluated as one-story, two-story, or mobile home. Non-residential content categories included the following types: eating and recreation, groceries and gas stations, multi-family residences, repair and home use, retail and personal services, professional businesses, public and semi-public, and warehouse and contractor services. The results of this panel were published in the report Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-To-Structure Value Ratios (CSVRS) In Support Of the Jefferson and Orleans Flood Control Feasibility Studies, June 1996 Final Report.

Automobile Depth-Damage. Vehicle depth-damage was based on interviews with car dealerships and insurance adjustors who had recent experience with flood damages and claims for automobiles. Based on these interviews with professionals relationships were developed between depth of flooding and percent damage. At 0.5 feet of flooding an automobile would incur 2.3% damage; at 1.0 feet of flooding an automobile would incur 22.8% damage; at 1.5 feet of flooding an automobile would incur 54.2% of damage; at 2.0 feet of flooding an automobile would incur 95.8% damage; and, at 3.0 feet of flooding an automobile would incur 100% damage. Automobile damages are then calculated by correlating depth of flooding, depth-damage per automobile, and damage per automobile. The elevation of each automobile is determined by its corresponding structure elevation.

SECTION VI – RISK-BASED ANALYSIS

Overview of Risk-Based Analysis. The use of risk-based analysis procedures for formulating and evaluating flood damage reduction measures (ER 1105-2-101) is required by the Army Corps of Engineers in conducting studies. Uncertainty is implicit in many areas of planning for water resource projects. The uncertainty arises due to error in the data being measured or errors inherent in the methods used to estimate the values of certain critical variables. The potential for error exists throughout the traditional analysis because each of the variables has been assigned a single point value rather than a range of values. In order to compensate for possible error, risk-based analysis can be applied to the planning and design of water resource projects. This approach, which quantifies the extent of systematic risk, provides the decision-maker with a broader range of information. Thus, a decision can be made that reflects the explicit tradeoff between risks and costs.

The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) computer program was utilized to evaluate flood damages using risk-based methods. This program is

used to quantify the uncertainty in discharge-exceedance probability, stage-discharge, and stage-damage functions and assimilates it into the economic and engineering performance analyses of alternatives. Monte Carlo simulation is used to compute the expected value of damage while explicitly accounting for the uncertainty in economic and hydraulic parameters used to determine flood inundation damages. To account for uncertainty, the analysis considered a range of possible values for each economic and hydrologic/hydraulic input, which is then used to calculate the elevation- or stage-damage curves. It also considered a probability distribution for the likely occurrence of any given outcome within the specified range. The HEC-FDA program used Monte Carlo simulation to derive the possible occurrences of each variable. Randomly generated numbers were used to simulate the occurrences of selected variables from within the established ranges and distributions. In order to use this program the inherent uncertainty associated with each of the key hydrologic/hydraulic and economic variables in the analysis was quantified.

Economic Uncertainty. Risk-based analysis was performed on four key economic variables: structure values, contents-to-structure value ratios, first floor elevations, and depth-damage relationships. Each of these variables was analyzed for its impact on the elevation-damage curve.

Uncertainty in Structure & Automobile Values. Uncertainty in structure values can result from errors in estimating the square footage of the structure, and/or inaccurate judgments regarding the age and condition of the structure. In order to determine the error associated with structure values, a comparison was made between the traditional windshield survey and a more precise method. Homeowners in Orleans and Jefferson Parishes were interviewed to collect more accurate information regarding square footage and other relevant information that affects structure value. Windshield surveys were used to determine the M&S values for a sample of 18 residential properties. These values were then compared to the M&S values compiled using data on the square footage and age of the structure provided by the homeowners. A similar procedure was used to compare the M&S values of 28 non-residential structures compiled during field surveys with data obtained from the owners of these businesses. These comparisons were made in order to estimate the uncertainty inherent in data compiled during drive-by surveys. The uncertainty is represented by a normal probability density function with a standard deviation of 11.4% for residential structures and 11.6% for non-residential structures. A triangular probability distribution function was used to determine the uncertainty surrounding the values assigned to the automobiles in the inventory. The most likely value was assumed to be the average value of a used car (\$13,548). The maximum value was assumed to be the average value of a new car before taxes, license, and shipping charges (\$19,700). The average 10-year depreciation value of an automobile (\$2,000) was used as the minimum value.

Uncertainty in Contents-to-Structure Value Ratios. On-site interviews were conducted for a sample of 10 structures from each of the three residential content categories (30 residential structures) and from each of the eight non-residential content categories (80 non-residential structures). A CSVR was computed for each structure in the sample based on the total depreciated content value developed from these interviews. A probability density function was then used to describe the distribution of these observations around the expected mean. A normal probability density function was used for each content category. The expected values and standard deviations are shown below for each of the three residential categories and the eight non-residential categories. This information can also be found on page 81 in the report dated June 1996 entitled Depth-Damage Relationships for Structures, Contents, and Vehicles and Content-to-Structure Value Ratios (CSVRS) In Support of the Jefferson and Orleans Flood Control Feasibility Studies.

Residential CSVRs

<u>Type of Structure</u>	<u>Expected Mean</u>	<u>Standard Deviation</u>
1-Story	65%	21%
2-Story	78%	21%
Mobile Homes	60%	24%

Non-Residential CSVRs

<u>Type of Structure</u>	<u>Expected Mean</u>	<u>Standard Deviation</u>
Eating	114%	48.2%
Grocery	117%	61%
Multifamily	37%	14%
Professional	43%	14%
Public	114%	71%
Repair	206%	102%
Retail	142%	93%
Warehouse	168%	98%

Uncertainty in First Floor Elevations. First floor elevations were determined using LIDAR NAVD88 2004.65 epoch and hand-levels to determine the height above ground level. Based on this comparison, a truncated normal probability density function was used to describe the uncertainty associated with this variable. A standard deviation of 0.6 feet was calculated surrounding the uncertainty of the LIDAR topographical data.

Uncertainty in Depth-Damage Relationships. A panel of experts developed depth-damage relationships for 5 residential structure categories and 3 non-residential structure

categories. Depth-damage relationships were also developed for 3 residential content categories and 8 non-residential categories. The panel determined the expected damage that would occur at each increment of flooding. A triangular probability density function was used to determine the uncertainty associated with each increment of flooding. A minimum, maximum and most likely damage estimate was provided for each increment of flooding.

Economic Uncertainty Results. As discussed above, risk-based analysis was performed on 4 key economic variables: structure values, CSVRs, first floor elevations, and depth-damage relationships. Each of these variables was analyzed for its impact on the stage-damage relationships. In order to develop a frequency-damage relationship, a damage value associated with an error relationship was developed for each stage associated with the frequency events for the without- and with-project conditions. An elevation-damage with error curve was developed for the stages associated with the frequency events.

SECTION VII – NET BENEFIT ANALYSIS

Expected Annual Benefits and Costs. The economic justification of the plan given detailed consideration was determined by comparing estimates of the average annual costs and expected annual benefits which are expected to accrue over the period of analysis (50 years). Recommendation of any construction plan by the Corps of Engineers requires that expected annual benefits equal or exceed average annual costs.

The values estimated for benefits and costs at the time of accrual were made comparable by conversion to an equivalent time basis using the FY 2012 Federal discount rate of 4.0 percent. The period of analysis, or project life, utilized in the analysis is 50 years. The benefits and costs are expressed as the average annual value of the present worth of all expenditures and all plan outputs. These expenditures and outputs are measured at a specific point in time (base year). The base year (2017), is the year in which the project becomes operational or when significant benefits start to accrue.

Estimated with-project damages would be limited to the effects of rainfall or events exceeding the level of protection. The total benefits of the project include the benefits anticipated over the 50-year project. The equivalent annual damage reduced (benefits) for inundation reduction for structures and automobiles were based on the results from the HEC-FDA program. The benefit of the alternative was compared with the costs to determine the economic justification of the proposed flood control alternative, benefit-to-cost ratio, and net benefits.

Total project first costs include costs for mitigation, real estate, and relocations. The schedule of yearly expenditures is annualized based on a base year of 2017 and is for a 4-

year period. Costs were converted to average annual values using the FY 2012 Federal discount rate of 4.0 percent, a project life of 50 years, and October 2011 price level. Table 12 displays first costs, average annual costs, average annual benefits, net benefits and the benefit-cost ratio. The recommended plan has net benefits of \$627,000 with a benefit-cost ratio of 1.55. Using the equivalent annual benefit data displayed in Table 7, there is at least a 75% chance that benefits to cost ratio will be greater than 1.55 and there is at least a 75% chance that equivalent annual net benefits will be greater than \$627,000.

SECTION VIII – NONSTRUCTURAL ANALYSIS

Methodology. The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) Version 1.2.4 certified model was used to analyze a structure-raising nonstructural alternative in addition to the structural alternatives being considered for the Slidell feasibility evaluation. The model was used to create a module that contained all of the residential structures with a floor elevation less than the stage associated with the 0.01 annual exceedance probability, or 100-year event, for reaches in the Slidell evaluation area. The residential structures in this module were raised to the target elevation which was set equal to the stage associated with the 100-year event for each study area reach. The HEC-FDA model was then used to calculate the without project damages based on the current first floor elevation of each structure in the inventory. The damages under the structure raising option were calculated based on all residential structures having a first floor elevation less than the target elevation. The reductions in the damages to the residential structures with an increased first floor elevation are the benefits attributable to the structure-raising alternative.

An Excel spreadsheet was used to estimate the cost of raising each of the residential structures to the target elevation. The costs were based on the difference in feet between the original first floor elevation and the target elevation (the 100-year stage). The number of feet that each structure was raised was rounded-up to the next one-foot increment.

Structure-Raising Option. A structure-raising option was considered for all residential structures within the 100-year floodplain of the study area. This option involved raising residential structures to the elevation of the stage associated with the without project condition 100-year storm event. Thus, the benefits associated with this option were defined as the reduction in damages that would occur from the rainfall associated with various storm events. The benefits and costs associated with this option are discussed below. The result of this analysis assumes 100 percent participation by all property owners with structures located below the elevation of the 100-year storm event. Commercial and industrial structures are generally not suitable candidates for structure-raising and thus was not included in this analysis.

The cost per square foot for raising a structure was based on data obtained during interviews with representatives of three major metropolitan New Orleans area contracting firms that specialize in the raising of structures. Costs were derived for slab and pier foundation residential structures with both one and two stories, and also for mobile homes. Table 14 displays the costs for each of the five residential categories analyzed.

The cost per square foot to raise an individual structure to the required height was multiplied by the footprint square footage of each structure to compute the costs to elevate the structure. The footprint square footage for each structure was determined by applying the average square footage estimated for each occupancy type displayed in Table 15. Costs to elevate a structure were added to a per structure temporary relocation cost to complete the total cost of the structure raising measure. Relocation costs included packing/moving, labor, storage, hotel costs, per diem costs, kennel costs for pets, and contingencies. Relocation costs for structure-raising, for the contractor specified period of the raising, 45 days, amounts to \$8,300 per structure. Total costs for all raised structures were annualized over the 50-year life of the project using the Fiscal Year 2012 federal discount rate of 4.0 percent and an October 2011 price level. It was assumed that all structure-raising activities would be completed within one year. Therefore, no interest during construction accrues.

Benefits were defined as the reduction in the without-project damages that would result from structures being raised to the 100-year stage. The benefits for the structure-raising option only considered the reduction in damages to residential structures and their contents, not nonresidential structures or automobiles. These benefits were then totaled by reach and compared to the costs of structure raising option. Economic justification was determined by comparing the expected annual benefits to the expected annual costs. Net benefits were calculated by subtracting the expected annual costs from the expected annual benefits. Table 16 shows the number of structures raised, total first costs, total annual costs, expected annual damages reduced, net benefits and benefit/cost ratios.

Table 1
SELA Slidell W-14 CANAL
Population

Study Area Population estimated by applying the Average Household Size of Slidell, 2.66		
	2010-2017	2066
Project Area	16,375	17,620
Census Area Population		
	2000 Population	2010 Population
City of Slidell	25,695	27,068
St. Tammany Parish	191,268	233,740
Louisiana	4,468,976	4,533,372

Source: U.S Census Bureau

Table 2
SELA Slidell W-14 CANAL
Median Household Income

	1999 Median Household Income	2005-2009 Median Household Income
City of Slidell	\$ 42,856	\$ 50,675
St. Tammany Parish	\$ 47,883	\$ 59,804
Louisiana	\$ 41,994	\$ 51,425

Source: U.S Census Bureau

Table 3
SELA Slidell W-14 CANAL
Employment- In labor force (population 16 years and over)

	2000 In labor force	2005-2009 In labor force
City of Slidell	12,048	12,555
St. Tammany Parish	92,343	109,785
Louisiana	2,016,114	2,112,875

Table 4
 SELA Slidell W-14 CANAL
 FEMA Flood Claims Between 1978 and 2010

	Number of Claims Filed	Total Amount Paid	Average
City Slidell	8,589	\$ 429,836,902	\$ 50,045
St Tammany	19,608	\$ 1,060,404,211	\$ 54,080

Note: Above dollar amounts are not in current dollar value. Dollar amounts reflect the prices at the time claims were filed.

Table 5
SELA Slidell W-14 CANAL
Number of Structures per Reach in the Existing Condition 2017

Reach	Auto	Commercial	Mobile Home	Residential	Total
B4	1121	237	10	874	2242
B5	394	148	0	246	788
R1	882	19	0	863	1764
R2	177	1	0	176	354
R3	26	24	0	2	52
T1	0	0	0	0	0
T2	0	0	0	0	0
T3	2	2	0	0	4
W0	268	74	10	184	536
W1	200	59	0	141	400
W10	200	32	0	168	400
W11	243	0	49	194	486
W12	23	22	0	1	46
W13	91	17	0	74	182
W2	555	41	0	514	1110
W3	573	5	3	565	1146
W4	0	0	0	0	0
W5	93	35	19	39	186
W7	564	42	0	522	1128
W8	584	48	0	536	1168
W9	979	13	0	966	1958
TOTAL	6975	819	91	6065	13950

Table 6
SELA Slidell W-14 CANAL
Average Depreciate Replacement Cost (2011 Price Level)

	Commercial	Mobile Home	Residential
Average Depreciate Replacement Cost	\$ 679,000	\$ 23,000	\$ 115,000

Table 7
SELA Slidell W-14 CANAL
Equivalent Annual Damages and Benefits

	Equivalent Annual Damages			Probability Damage Reduced Exceed Indicated Values		
	Total Without Project	Total With Project	Damage Reduced	0.75	0.50	0.25
Total	\$ 17,808,000	\$ 16,049,000	\$ 1,759,000	\$ 1,480,400	\$ 1,757,920	\$ 2,012,540

Table 8
SELA Slidell W-14 CANAL
Expected Annual Damages and Benefits, 2017

	Equivalent Annual Damages			Probability Damage Reduced Exceed Indicated Values		
	Total Without Project	Total With Project	Damage Reduced	0.75	0.50	0.25
Total	\$ 17,010,730	\$ 15,278,270	\$ 1,732,460	\$ 1,416,640	\$ 1,718,490	\$ 2,013,430

Table 9
SELA Slidell W-14 CANAL
Expected Annual Damages and Benefits, 2066

	Equivalent Annual Damages			Probability Damage Reduced Exceed Indicated Values		
	Total Without Project	Total With Project	Damage Reduced	0.75	0.50	0.25
Total	\$ 17,987,640	\$ 16,223,180	\$ 1,764,460	\$ 1,494,900	\$ 1,766,810	\$ 2,012,280

Table 10
SELA Slidell W-14 CANAL
Equivalent Annual Damages per Reach

Equivalent Annual Damages			
	Total Without Project	Total With Project	Damage Reduced
B4	\$4,875,000	\$3,456,000	\$1,419,000
B5	\$658,000	\$658,000	\$0
R1	\$36,000	\$28,000	\$8,000
R2	\$376,000	\$376,000	\$0
R3	\$62,000	\$59,000	\$3,000
T1	\$52,000	\$52,000	\$0
T2	\$2,708,000	\$2,708,000	\$0
T3	\$7,129,000	\$7,116,000	\$13,000
W0	\$130	\$130	\$0
W1	\$460	\$450	\$10
W10	\$94,000	\$93,000	\$1,000
W11	\$546,000	\$415,000	\$131,000
W12	\$492,000	\$363,000	\$129,000
W13	\$329,000	\$329,000	\$0
W2	\$16,000	\$16,000	\$0
W3	\$116,000	\$83,000	\$33,000
W4	\$213,000	\$212,000	\$1,000
W5	\$12,000	\$7,000	\$5,000
W7	\$75,000	\$59,000	\$16,000
W8	\$20,000	\$19,000	\$1,000
W9	\$500	\$470	\$30
Total	\$17,808,000	\$16,049,000	\$1,759,000

Table 11
 SELA Slidell W-14 CANAL
 Number of Structures per Reach

EQUIVALENT ANNUAL COST (2011 Price Index)				
Year	Period of Analysis	Annual Expenditures	Present Value (PV) Factor	PV Annual Expenditures
2013	-3	\$ 4,002,237	1.125	\$4,501,972
2014	-2	\$ 13,043,754	1.082	\$14,108,124
2015	-1	\$ 3,458,900	1.040	\$3,597,256
2016	0	\$ 1,447,550	1.000	\$1,447,550
2017	1	\$ -	0.962	\$0
2018	2	\$ -	0.925	\$0
2019	3	\$ -	0.889	\$0
2020	4	\$ -	0.855	\$0
2021	5	\$ -	0.822	\$0
2022	6	\$ -	0.790	\$0
2023	7	\$ -	0.760	\$0
2024	8	\$ -	0.731	\$0
2025	9	\$ -	0.703	\$0
2026	10	\$ -	0.676	\$0
2027	11	\$ -	0.650	\$0
2028	12	\$ -	0.625	\$0
2029	13	\$ -	0.601	\$0
2030	14	\$ -	0.577	\$0
2031	15	\$ -	0.555	\$0
2032	16	\$ -	0.534	\$0
2033	17	\$ -	0.513	\$0
2034	18	\$ -	0.494	\$0
2035	19	\$ -	0.475	\$0
2036	20	\$ -	0.456	\$0
2037	21	\$ -	0.439	\$0
2038	22	\$ -	0.422	\$0
2039	23	\$ -	0.406	\$0
2040	24	\$ -	0.390	\$0
2041	25	\$ -	0.375	\$0
2042	26	\$ -	0.361	\$0
2043	27	\$ -	0.347	\$0
2044	28	\$ -	0.333	\$0
2045	29	\$ -	0.321	\$0
2046	30	\$ -	0.308	\$0
2047	31	\$ -	0.296	\$0
2048	32	\$ -	0.285	\$0
2049	33	\$ -	0.274	\$0
2050	34	\$ -	0.264	\$0
2051	35	\$ -	0.253	\$0
2052	36	\$ -	0.244	\$0
2053	37	\$ -	0.234	\$0
2054	38	\$ -	0.225	\$0
2055	39	\$ -	0.217	\$0
2056	40	\$ -	0.208	\$0
2057	41	\$ -	0.200	\$0
2058	42	\$ -	0.193	\$0
2059	43	\$ -	0.185	\$0
2060	44	\$ -	0.178	\$0
2061	45	\$ -	0.171	\$0
2062	46	\$ -	0.165	\$0
2063	47	\$ -	0.158	\$0
2064	48	\$ -	0.152	\$0
2065	49	\$ -	0.146	\$0
2066	50	\$ -	0.141	\$0
TOTAL (1000's)		\$ 21,952,440		\$23,654,902
Interest rate 4 %	0.04	0.04655		
Average Annual Costs				\$1,101,140
O&M Costs (Based on Revised Cost Estimate Report)				\$30,600
Total Average Annual Construction Costs (\$ Millions)				\$1,131,740

Table 12
 SELA Slidell W-14 CANAL
 (2011 PRICE LEVEL, 4.0% INTEREST RATE)
 Total Equivalent Annual Net Benefits
 (\$1000's)

Item	Base Year 2017 (\$1000's)
Without Project Damages	\$ 17,808
Residual Equivalent Annual Damages	\$ 16,049
Total Equivalent Annual Benefits	\$ 1,759
First Costs	\$ 21,952
Operation & Maintenance	\$ 31
Total Equivalent Annual Costs	\$ 1,132
B/C Ratio	1.55
Equivalent Annual Net Benefits	\$ 627

Notes:

1. Benefits and costs are compared using 2011 price levels, a 4.0 percent interest rate with a base year of Fiscal Year 2017
2. The damages and benefits were calculated for residential and non-residential structures, their contents and vehicles only.

Table 13
SELA Slidell W-14 CANAL
Non Structural Expected Annual Damages per Reach

Equivalent Annual Damages			
	Total Without Project	Total With Project	Damage Reduced
B4	\$4,488,220	\$2,676,030	\$1,812,190
B5	\$650,570	\$439,180	\$211,390
R1	\$35,340	\$35,340	\$0
R2	\$375,730	\$103,610	\$272,120
R3	\$51,060	\$51,060	\$0
T1	\$19,640	\$19,640	\$0
T2	\$2,582,330	\$1,087,700	\$1,494,630
T3	\$7,056,290	\$6,683,890	\$372,400
W0	\$0	\$0	\$0
W1	\$260	\$260	\$0
W10	\$93,500	\$93,500	\$0
W11	\$542,700	\$256,970	\$285,730
W12	\$486,320	\$107,900	\$378,420
W13	\$302,560	\$222,870	\$79,690
W2	\$0	\$0	\$0
W3	\$7,860	\$7,860	\$0
W4	\$212,410	\$147,640	\$64,770
W5	\$11,900	\$11,900	\$0
W7	\$74,670	\$22,870	\$51,800
W8	\$18,930	\$18,930	\$0
W9	\$430	\$430	\$0
Total	\$17,010,720	\$11,987,580	\$5,023,140

Table 14
 SELA Slidell W-14 CANAL
 Cost Per Square Foot for Structure Raising, 2011 Price Level

Ft. of Raising	1-Story Slab	2-Story Slab	1-Story Pier	2-Story Pier	Mobile Home
1	75.68	83.91	66.91	74.04	37.29
2	75.68	83.91	66.91	74.04	37.29
3	77.33	85.55	69.65	76.78	37.29
4	80.07	91.04	69.65	76.78	37.29
5	80.07	91.04	69.65	76.78	45.52
6	81.72	92.68	71.30	78.43	45.52
7	81.72	92.68	71.30	78.43	45.52
8	84.46	95.43	72.94	80.07	45.52
9	84.46	95.43	72.94	80.07	45.52
10	84.46	95.43	72.94	80.07	45.52
11	84.46	95.43	72.94	80.07	45.52
12	84.46	95.43	72.94	80.07	45.52
13	87.20	100.91	74.59	81.72	45.52

Table 15
 SELA Slidell W-14 CANAL
 Average Square Footage by Occupancy Type

	1-Story Slab	2-Story Slab	1-Story Pier	2-Story Pier	Mobile Home
Average Square Ft.	1,577	1,754	1,364	1,764	940

Table 16
 SELA Slidell W-14 CANAL
 (2011 PRICE LEVEL, 4.0% INTEREST RATE)
 Total Expected Annual Net Benefits
 (\$1000's)

Item	Base Year 2017 (\$1000's)	
Number of Structures Raised		588
Without Project Damages	\$	17,011
Residual Equivalent Annual Damages	\$	11,988
Total Equivalent Annual Benefits	\$	5,023
Implementation Costs	\$	74,731
Amortization Rate		0.04655
Total Equivalent Annual Costs	\$	3,479
B/C Ratio		1.44
Equivalent Annual Net Benefits	\$	1,544

**SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

**APPENDIX B
ENVIRONMENTAL SUPPORTING DOCUMENTATION**



United States Department of the Interior

FISH AND WILDLIFE SERVICE

646 Cajundome Blvd.

Suite 400

Lafayette, Louisiana 70506

October 12, 2011

Ms. Joan Exnicios
Chief, Environmental Planning Branch
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

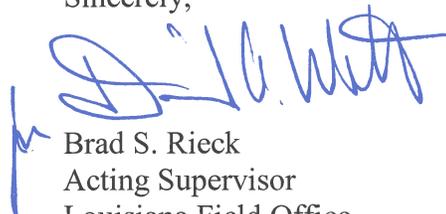
Dear Ms. Exnicios:

Please reference the October 5, 2011, electronic mail (e-mail) message and attached documentation from Mr. Joseph Musso of your staff regarding the U.S. Army Corps of Engineers, New Orleans District, proposal to modify approximately 4.0 miles of the W-14 Canal, in the City of Slidell, St. Tammany Parish, Louisiana. Those modifications would vary by reach, and would include clearing and snagging certain segments, as well as widening and deepening portions of the Canal. The project would also include expanding an existing detention pond, constructing overflow weirs, installing culverts, and replacing an existing bridge. The U.S. Fish and Wildlife Service (Service) has reviewed the information provided, and offers the following comments in accordance with provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

At this time, the Service is unaware of any threatened or endangered species or their critical habitat within, or in the immediate vicinity of, the proposed project area. No further endangered species consultation with the Service would be required for the proposed action, unless there are changes in the scope or location of the proposed project or the project has not been initiated one year from the date of this letter. If the proposed project has not been initiated within one year, follow-up consultation should be accomplished with the Service prior to making expenditures because our threatened and endangered species information is updated annually. If the scope or location of the proposed project is changed, consultation should occur as soon as such changes are made.

If you need further assistance or have any questions regarding our comments, please contact David Soileau, Jr., (337/291-3109) of this office.

Sincerely,



Brad S. Rieck
Acting Supervisor
Louisiana Field Office

cc: LDWF, Natural Heritage Program, Baton Rouge, LA
LDWF, Attn: Mr. Kyle Balkum, Baton Rouge, LA

BOBBY JINDAL
GOVERNOR



PEGGY M. HATCH
SECRETARY

State of Louisiana
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES

NOV 1 2011

U.S. Army Corps of Engineers- New Orleans District
P.O. Box 60267
New Orleans, LA 70160-0267

Attention: Joseph Musso

RE: Water Quality Certification (WQC 081015-04/AI 161334/CER 20110001)
Southeastern Louisiana Urban Flood Damage Reduction Project,
W-14 Drainage Canal
St. Tammany Parish

Dear Mr. Musso:

The Louisiana Department of Environmental Quality (the Department) has reviewed your application to construct a new pump station, replace bridges, install culverts, dredge waterbottoms, excavate land and place spoil material for municipal drainage improvements, along the W-14 Drainage Canal in Slidell, Louisiana. This revision concerns the reshaping of a portion of the W-14 Canal, enlargement of a stormwater detention area, and other associated activities.

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. Therefore, the Department hereby issues a Water Quality Certification to the U.S. Army Corps of Engineers.

If you have any questions, please call Jamie Phillippe at 225-219-3225.

Sincerely,

A handwritten signature in black ink, appearing to read "MCM", written over a horizontal line.

Melvin C. Mitchell, Sr.
Administrator
Water Permits Division

MCM/jjp



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P. O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

SEP 22 2011

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

No known historic properties will be affected by this undertaking. This effect determination could change should new information come to our attention.

Pam Breaux 11-16-11
Pam Breaux Date
State Historic Preservation Officer

Re: Continued Consultation for W14 Canal Drainage Project, City of Slidell, St. Tammany Parish, Louisiana

Dear Ms. Breaux:

The U.S. Army Corps of Engineers, New Orleans District (The Corps), has made changes to the W14 Canal drainage project for the city of Slidell, St. Tammany Parish. In a letter from your office dated October 7, 2008, you agreed with the Corps conclusions that no impacts to cultural resources would be caused by the project as proposed. At this time, the Corps has had to modify the project designs primarily by removing proposed aspects of the previous project. The Corps therefore concludes that the original conclusion of "no historic properties affected" still applies to the majority of the current project.

Two project areas have been expanded. One is a section of the W14 Canal itself, which will be cleared of debris from North Road to Interstate 12. This canal is previously in existence and no enlargement is planned. A field visit by archaeologist Paul Hughbanks found no indication that any cultural resources might exist within the canal. Second, the Robert Road Detention Pond will be expanded from its previously proposed size, by an additional 11 acres. This area was surveyed by R. Christopher Goodwin and Associates in 2008 and resulted in Report # 22-3151 and a conclusion of no historic properties affected. The additional area proposed was viewed by Paul Hughbanks, and found no indication that cultural resources may exist.

Because of the smaller overall size of the project impacts and the review of the two additional project areas, the Corps concludes that the revised W14 Canal drainage project still has no impact to cultural resources and will not affect historic properties. We ask that you provide any comment to this conclusion within thirty days. Please contact Dr. Paul Hughbanks at (504) 862-1100 if you have any questions.

Sincerely,

Joan M Exnicios

Joan M. Exnicios
Chief, New Orleans Environmental Branch



United States Department of the Interior



FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

January 9, 2012

Mr. Richard Hartman
Branch Chief
Habitat Conservation Division
National Marine Fisheries Service
c/o Louisiana State University
Baton Rouge, Louisiana 70803-7535

Dear Mr. Hartman:

Attached is the Fish and Wildlife Coordination Act Report on the Slidell Flood Control/W-14 Improvement Project. This report constitutes the 2(b) report of the Fish and Wildlife Service (Service) as required by the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Your comments, if provided, were incorporated into our final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions or comments regarding this report, please have them contact Karen Soileau (337/291-3132) of this office.

Your cooperation in this matter is appreciated.

Sincerely,

David Walther
Acting Supervisor
Louisiana Field Office

Attachment





United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506



January 9, 2012

Mr. Robert Barham
Secretary
Louisiana Department of Wildlife and Fisheries
Post Office Box 98000
Baton Rouge, Louisiana 70898-9000

Dear Mr. Barham:

Attached is the Fish and Wildlife Coordination Act Report on the Slidell Flood Control/W-14 Improvement Project. This report constitutes the 2(b) report of the Fish and Wildlife Service (Service) as required by the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). Your comments, if provided, were incorporated into our final report prior to its submission to the U.S. Army Corps of Engineers. Should your staff have any questions or comments regarding this report, please have them contact Karen Soileau (337/291-3132) of this office.

Your cooperation in this matter is appreciated.

Sincerely,

David Walther
Acting Supervisor
Louisiana Field Office

Attachment





United States Department of the Interior

FISH AND WILDLIFE SERVICE

646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

January 9, 2012

Colonel Edward R. Fleming
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Fleming:

The New Orleans District Corps of Engineers (Corps) is conducting the Feasibility Phase of the Slidell Flood Control/W-14 Improvement Project as part of the Southeast Louisiana Urban Flood Control Project (SELA). SELA, which was authorized by the Energy and Water Development Appropriations Act of 1996, consists of numerous individual flood control projects that have been, and continue to be, developed and constructed in Orleans, Jefferson, and St. Tammany Parishes, Louisiana. The proposed project was initially evaluated in the Corps' 1995 Reconnaissance Study, for which the U.S. Fish and Wildlife Service (Service) provided a January 16, 1996, planning-aid report. At that time, the Corps was proposing project authorization under the continuing authority of Section 205 of the Flood Control Act of 1948, but the project has since been incorporated as a component of the SELA.

On June 25, 2007, the Service issued the Corps a draft Fish and Wildlife Coordination Act (FWCA) Report. The associated Feasibility Study for the Slidell Flood Control/W-14 Improvement Project included the evaluation of alternatives for flood control in the City of Slidell, in St. Tammany Parish, Louisiana. The purpose of the tentatively selected plan in that study was to reduce flooding and flood damages caused by interior drainage problems within the W-14 Canal Basin by clearing, de-snagging, excavating, and concrete lining portions of the W-14 Canal. That plan also included a new floodwater detention pond, enlargement of an existing detention pond, three bridge replacements, a gated control structure, and a new pump station.

Subsequent to issuance of the July 2007 draft FWCA Report, revisions to the project design were made and a revised draft and final FWCA Report were issued to the Corps in October 2008 and July 2009, respectively. That proposed project included improving approximately 4 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, installation of concrete "U" framed channels within portions of the canal, excavating 4 new detention ponds with overflow weirs, expanding an existing pond, installing culverts, replacing 3 existing bridges, and constructing a new pump station. In addition, approximately 750,000 cubic yards of earthen material excavated would be used to create approximately 100 acres of brackish marsh in an area that has eroded to open water on the

Service-administered Big Branch Marsh National Wildlife Refuge (BBMNWR).

Since issuance of the July 2009 final FWCA Report, however, additional revisions to the proposed project have been made. As currently proposed, the recommended plan includes improving approximately 4.1 miles of the existing W-14 Canal by widening portions of the existing canal and lowering its existing invert elevation along certain reaches to improve flood flow capacity, clearing and snagging portions of the W-14 Canal, construction of a detention pond, expanding an existing pond, constructing overflow weirs, installing culverts, and relocating an existing bridge.

The Service has completed an evaluation of the subject project. This letter report contains the Service's analysis of, and position on, that project; it also constitutes the report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). We provided copies of the draft report to the National Marine Fisheries Service (NMFS) and the Louisiana Department of Wildlife and Fisheries (LDWF); their comments, if any, have been incorporated into this report.

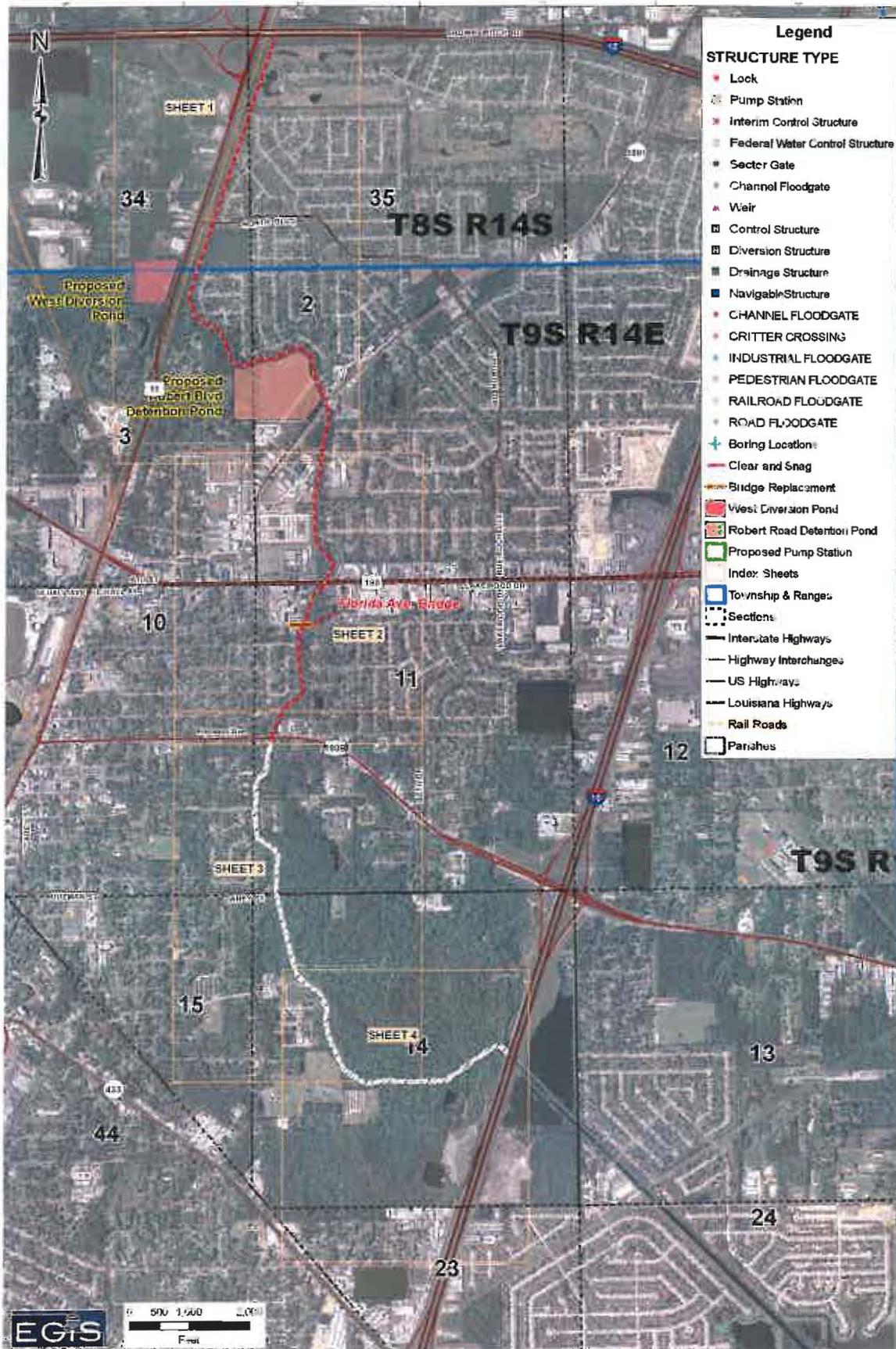
DESCRIPTION OF THE STUDY AREA

The study area is located within the Lake Pontchartrain Basin of southeast Louisiana and encompasses the flood-prone sections of Slidell within the W-14 Canal Basin, in St. Tammany Parish, Louisiana (Figure 1). The study area consists primarily of high-density residential and commercial development, although a few stands of mixed pine-hardwood remain. According to the Natural Resources Conservation Service's 1990 *Soil Survey of St. Tammany Parish, Louisiana*, most of the study area lies on the terrace soil complex of Myatt-Stough-Prentiss. They are poorly drained to moderately well drained soils that are loamy throughout, and are level to very gently sloping. Storm water runoff from the study area flows into the W-14 Canal via natural gravity drainage, and then drains southeasterly, beneath U.S. Interstate 10, and eventually into the Fritchie Marsh, along the northeast shore of Lake Pontchartrain.

In addition to residential and commercial development, several mixed pine-hardwood stands occur in the study area. Those stands vary in size, vegetative species composition, and maturity and most of the larger forested tracts occur in the southeastern portion of the study area. There is also approximately 19.3 acres of forest that form a narrow buffer around the 4 miles of W-14 Canal that would be impacted by the proposed project. Historically, pine savannah habitat occurred throughout much of the project area.

DESCRIPTION OF FISH AND WILDLIFE RESOURCE CONDITIONS

The more highly developed areas of the study area provide minimal habitat value for fish and wildlife resources. The W-14 Canal suffers from poor water quality and likely only provides habitat for such fish species as bowfin, spotted gar, and mosquito fish. In their 2000 *Louisiana's*



*Image provided by the New Orleans District Corps of Engineers.

Figure 1. Slidell Flood Control/W-14 Improvement Project study area.

Nonpoint Source Management Plan, the Louisiana Department of Environmental Quality (LDEQ) classified the W-14 Canal as “not supporting” its designated uses of primary and secondary contact recreation, and fish and wildlife propagation. LDEQ attributes that poor water quality to organic enrichment, low dissolved oxygen levels, pathogens, and oil and grease from inflow and infiltration from urban runoff, storm sewers, and septic tanks. Resident and migratory avian species that use the W-14 Canal for occasional feeding and/or loafing include wood duck, great egret, snowy egret, and green heron. The W-14 Canal also provides habitat for various species of frogs, turtles, and snakes, including the bronze frog, green tree frog, red-eared turtle, Mississippi mud turtle, speckled kingsnake, broad-banded water snake, and western cottonmouth. The small forested area (primarily a 20 to 30-foot-wide strip) associated with the banks of the W-14 Canal is comprised mainly of young Chinese tallow-tree, sweetgum, loblolly pine, slash pine, and water oak, and provides moderate- to low-quality habitat for mammals such as Virginia opossum, northern raccoon, and nine-banded armadillo.

Although the study area was severely impacted by Hurricane Katrina in 2005, the larger forested tracts in the project vicinity provide higher quality habitat for a variety of wildlife species. Those tracts provide greater vegetation diversity and the larger size of those tracts provides a buffer (particularly in interior forest areas) from urban-associated disturbances. The few overstory species in those larger forests that remain include slash pine, water oak, southern magnolia, sweetbay magnolia, shortleaf pine, and sweetgum. Mid- and understory species include yaupon, wax myrtle, Japanese honeysuckle, Chinese privet, poison ivy, muscadine, and pepper-vine. Migratory and non-migratory songbirds, game birds, and raptors use those larger forested tracts for feeding, roosting, and/or nesting; those species include wood thrush, red-headed woodpecker, Carolina chickadee, brown thrasher, Carolina wren, yellow-rumped warbler, American woodcock, mourning dove, red-shouldered hawk, and barred owl. Some of those non-game species have exhibited substantial population declines over the last 30 years, primarily as the result of habitat loss and fragmentation. The study area also supports small game mammals such as the eastern cottontail, swamp rabbit, gray squirrel, and fox squirrel. Numerous species of small rodents, bats, and other mammals such as the short-tailed shrew, eastern mole, southern flying squirrel, red bat, eastern pipistrelle, Virginia opossum, northern raccoon, and nine-banded armadillo, also inhabit the larger forested tracts within the study area.

Seven species of plants and animals that are federally listed under the Endangered Species Act (ESA) of 1973, occur within St. Tammany Parish. Within the proposed project area, however, only the larger forested tracts may provide suitable habitat for the federally listed gopher tortoise and red-cockaded woodpecker. Based on previous field assessments, we concurred, in a June 22, 2004, letter, with the Corps’ determination, that the proposed project is not likely to adversely affect red-cockaded woodpeckers or gopher tortoises because those areas did not support these species. Because of the significant amount of damage sustained to timber within the study area due to Hurricane Katrina and because of the presence of a dense hardwood understory and midstory, the Service continues to concur with your determination that the project, as currently proposed, is not likely to adversely affect red-cockaded woodpeckers or gopher tortoises.

Under future-without-project conditions, residential and commercial development within the W-14 Canal study area will likely continue, despite the area's poor drainage and susceptibility to flooding from tropical storm events. Developmental trends for the study area are likely to continue at approximately the same rate, which was determined using specialized software to classify infrared aerial photography. That image classification process, which involves an analysis of low-level, high-resolution aerial photographs, was used to define developed and natural features of the study area (Figure 2). Using 1998 and 2004 digital orthophoto quarter quadrangles (DOQQs) for our analysis, we have determined the developmental rate to be 11 percent over the last 6 years, or 1.83 percent per year within our developmental rate analysis area, which is an approximation of the project study area (Figure 3). Existing fish and wildlife habitat values are expected to remain relatively constant over the project life, but will eventually decrease as forested habitats become smaller and more fragmented.

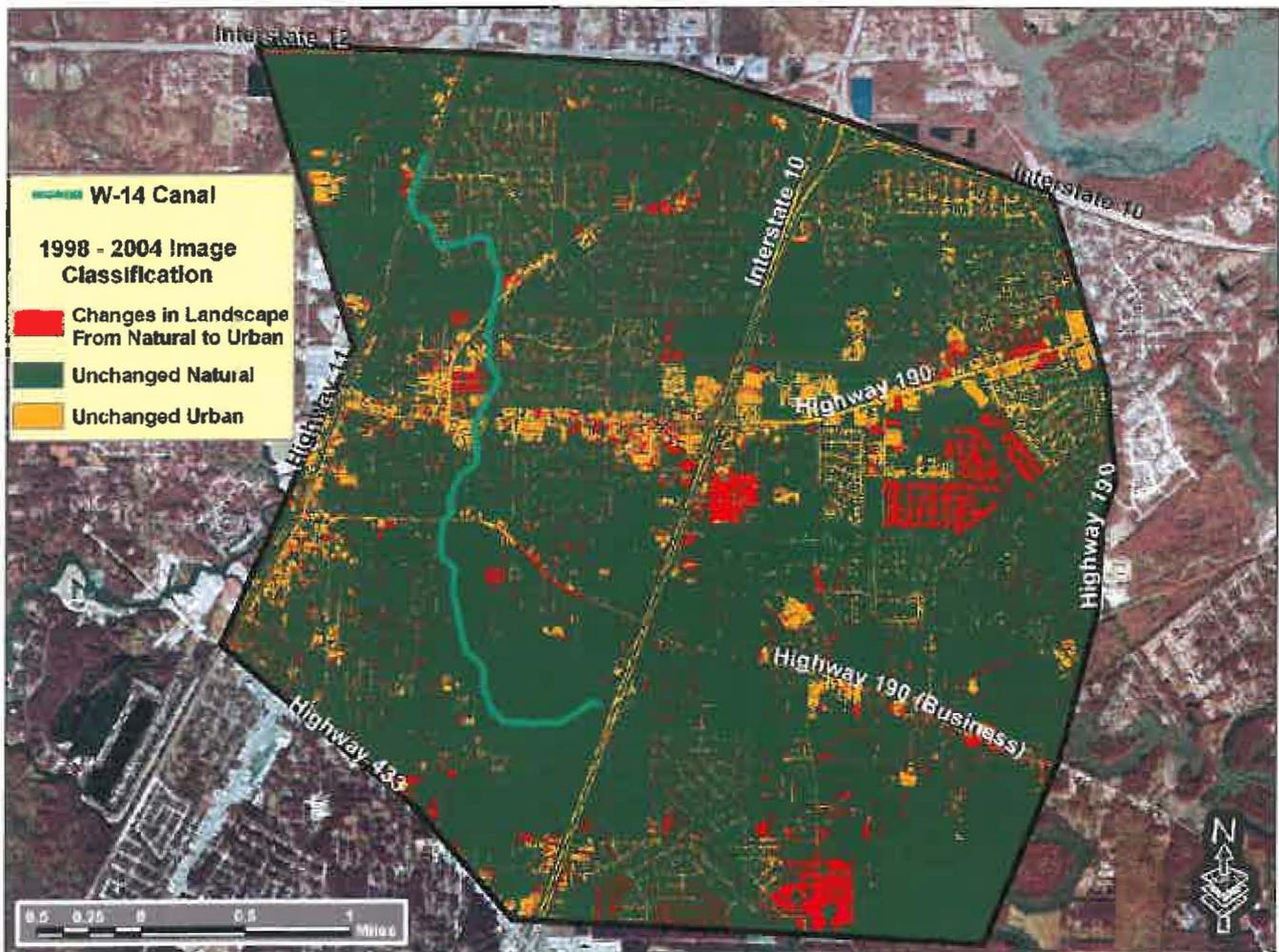


Figure 2. Developmental rate analysis area displayed on 2004 DOQQs.

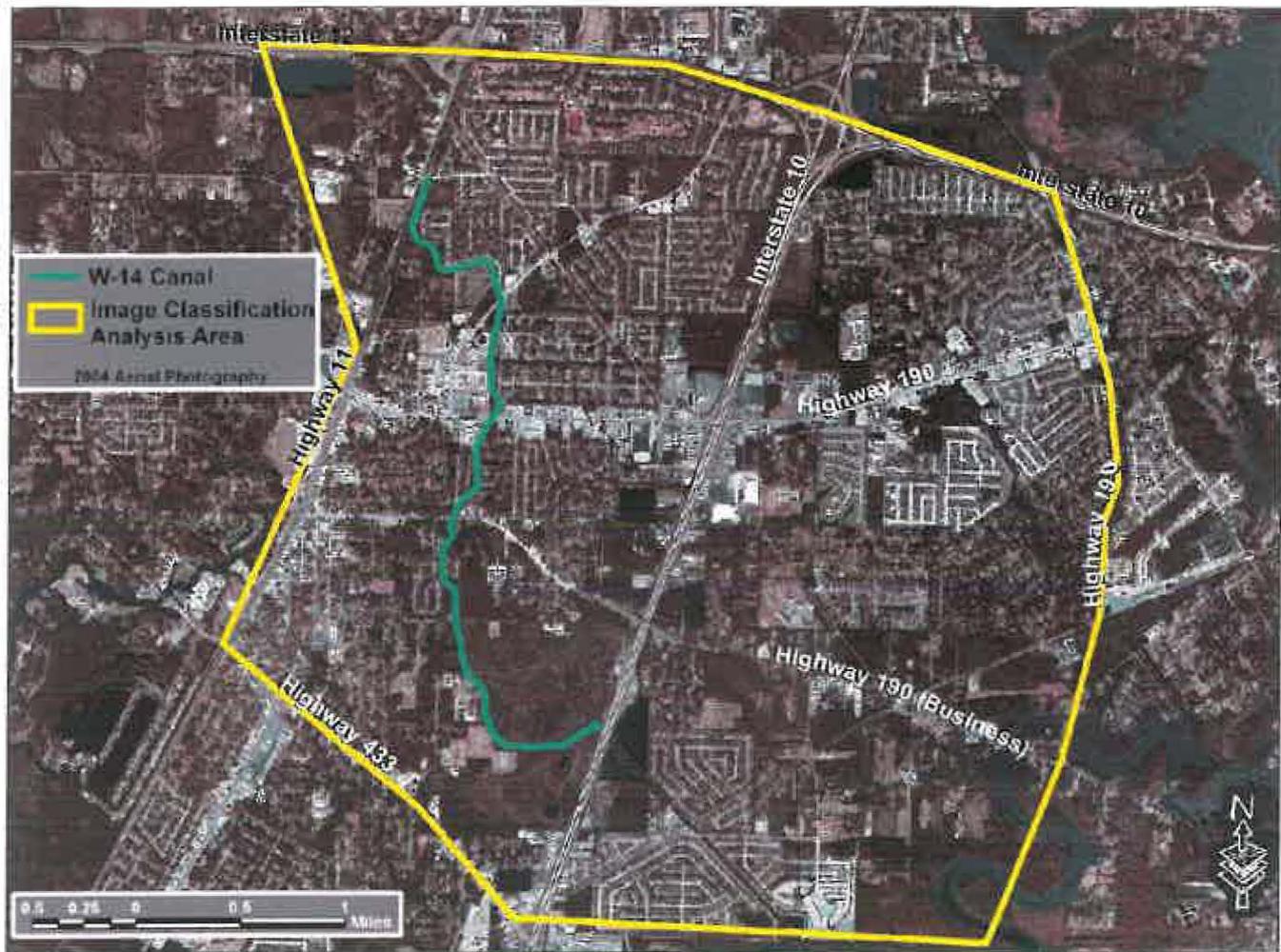


Figure 3. Image classification used for developmental rate analysis area.

In addition to the tentatively selected plan, two alternatives were considered during feasibility evaluations of the W-14 watershed. The no-action alternative was considered but rejected, due to existing and projected flooding problems within the study area, and the need to remedy those problems. Another alternative involves the structural raising of all residential structures within the 100-year floodplain. Although structural raising is shown by this analysis to be economically feasible, the net benefits associated with such a project are less than the net benefits for the structural plan.

DESCRIPTION OF IMPACTS

Implementation of the W-14 Canal modifications would directly impact approximately 19.3 acres of moderate to low-quality mixed pine-hardwood forest and open water habitats. The proposed construction of the overflow weir at the existing West Diversion Detention Pond and expansion of the Robert Road detention pond would impact approximately 0.3 and 11.7 acres of mixed pine-hardwood forest, respectively (Table 1).

Table 1. Project impacts to fish and wildlife habitat (primarily forested wetlands).

Project Feature	TOTAL IMPACT ACREAGE	CREDITS IMPACTED BY PROJECT*
W-14 Canal Modifications and Pumping Station	7.32	20.8 (permanent impacts)
		26.6 (temporary impacts)
Robert Road Detention Pond	11.7	101.0
West Detention Pond (overflow weir construction)	0.3	
West Detention Pond	NA**	NA**
PROJECT TOTAL	19.32	148.5

* Credits Impacted by Project – Calculated using the Modified Charleston Methodology.

** Detention pond previously constructed and mitigation developed.

To quantify anticipated project impacts to fish and wildlife resources, the Service used the Modified Charleston Methodology (MCM). That model was selected over the Habitat Assessment Methodology (HAM) for bottomland hardwoods (Louisiana Department of Natural Resources 1994) because: (1) of the available models, the MCM evaluates habitat-related variables that are most appropriate for mixed pine-hardwood and pine-savannah habitats, and (2) pine tree species are present in relatively high numbers throughout the project area. Baseline values for model variables were obtained from site visits to the area, communication with Corps staff, and review of aerial photographs of the project area. Details of our MCM calculations and associated assumptions are included in Appendix A. Our MCM analyses indicate that project implementation would result in the direct loss of 148.5 credits of fish and wildlife habitat.

The Service’s Mitigation Policy (U.S. Fish and Wildlife Service 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values impacted. Construction of the West Detention Pond was conducted by the City of Slidell under Clean Water Act – Section 404 Permit SE(St. Tammany Parish Wetlands)267, issued on September 17, 1996. To compensate for all unavoidable project related impacts to wetland values and functions, the City of Slidell donated \$30,225.00 (13 acres at \$2,325.00 per acre) to a mitigation fund dedicated to acquisition, enhancement, management, and administration of a pine flatwood wetland site in St. Tammany Parish to be owned and operated by the Louisiana field office of The Nature Conservancy. Because the applicant provided mitigation for impacts associated with the construction of the West Detention Pond through the Section 404 permitting process, as described, the Service will not request further mitigation from the Corps for those impacts. However, because the currently

proposed construction of the eastern berm was not included within that permit, the Corps should mitigate for any impacts associated with that activity. The remaining forested habitat that would be impacted by the W-14 Canal modifications and the Robert Road detention pond is disjunct and fish and wildlife habitat values are significantly lower due to the influence of adjacent urban areas. Those habitats would be classified as a Resource Category 4, with a mitigation goal of “minimize loss of habitat value.”

To replace the fish and wildlife habitat values lost through project-related impacts, the Corps should develop and fund compensatory mitigation actions that would produce 148.5 credits according to the MCM crediting scale. Those actions should involve the restoration, enhancement, and/or preservation of pine savannah and/or pine-hardwood habitats. Such mitigation may be accomplished at an approved wetland mitigation bank within, or as close as possible to, the Liberty Bayou-Tchefuncte watershed (Hydrologic Unit Code 08090201), but should not be obtained from outside of the Lake Pontchartrain Basin. The Service, NMFS, and LDWF should be involved in planning and/or evaluating the adequacy of all proposed mitigation plans.

CONCLUSIONS AND RECOMMENDATIONS

Construction of the proposed flood control project would result in the loss of 19.32 acres of mixed pine-hardwood forest that provide 148.5 credits in its current state (i.e., future without project). The Service would not object to the construction of the proposed W-14 Canal improvement project provided the following fish and wildlife conservation recommendations are implemented:

- 1) The Corps shall develop and implement mitigation action(s) that would provide 148.5 credits to compensate for the unavoidable, project-related loss of forested wetlands. Such mitigation may occur at an approved pine savannah and/or pine-hardwood wetland mitigation bank within, or as close as possible to, the Liberty Bayou-Tchefuncte watershed (Hydrologic Unit Code 08090201), but not outside of the Lake Pontchartrain Basin. The Service, NMFS, and LDWF should be consulted regarding the adequacy of any proposed mitigation projects, and should be provided with documentation to verify that the required mitigation credits have been acquired.
- 2) Modification, addition, and/or elimination of project elements during future project planning and construction stages shall be fully coordinated with the Service and other natural resource agencies to ensure the continued validity of our impact analysis and mitigation recommendations.
- 3) All clearing and snagging shall adhere to the Stream Obstruction Removal Guidelines (1983) developed by the Stream Renovation Guidelines Committee.
- 4) Snagging and clearing within the W-14 Canal shall only involve removal of obstructions and debris at or below mean high water. Trees above this point that are

in imminent danger of falling into the channel may also be removed, but their stumps and roots shall be left in place to reduce bank erosion.

- 5) Only debris accumulations that are obstructing flow, or are likely to cause problems in the near future, shall be removed. Isolated or single logs shall not be disturbed if they are embedded, lodged, or rooted in the channel and are not causing flow problems.
- 6) Equipment that would minimize damage to instream and riparian habitat (i.e., chain saws, flatboats, etc.) shall be used.
- 7) Access routes for equipment shall be selected to minimize floodplain disturbance (i.e., bridge rights-of-way for access to channel).

We appreciate the cooperation of your staff in this study. If you or your staff have any questions regarding our comments, please contact Karen Soileau of this office at (337) 291-3132.

Sincerely,



David Walther
Acting Supervisor
Louisiana Field Office

cc: USFWS, Southeast Louisiana Refuges Complex, Lacombe, LA
EPA, Dallas, TX
NOAA, Fisheries Service, Baton Rouge, LA
LDWF, Baton Rouge, LA
LDNR (OCM), Baton Rouge, LA

LITERATURE CITED

- Louisiana Department of Natural Resources. 1994. Habitat assessment models for fresh swamp and bottomland hardwoods within the Louisiana coastal zone. State of Louisiana publication. 26pp.
- Louisiana Department of Environmental Quality. 2000. Louisiana's nonpoint source management plan. State of Louisiana: Water quality management plan (6):334pp.
- U.S. Natural Resources Conservation Service. 1990. Soil survey of St. Tammany Parish, Louisiana. U.S. Government Printing Office O-205-524:QL3. 141pp.
- U.S. Fish and Wildlife Service. 1981. U.S. Fish and Wildlife Service mitigation policy. Federal Register 46 (15):7644-7663.

APPENDIX A

HABITAT ANALYSIS PROJECT INFORMATION SHEETS FOR W-14 CANAL

SUMMARY WORKSHEET

Mitigation Summary Worksheet For Permit Application #

Mitigation will be performed at:

(No Bank Selected)

AND/OR Mitigation will be site specific and performed at:

0

0

1. Impacts to be Mitigated

Credits	Acres
148.5	19.3

2. Out of Basin Factor

Project-Specific Mitigation

Bank

Required	Value
No	1
Yes	#N/A

3. Project-specific Mitigation Project Credit Summary

Credits	Acres
1504.0	52.0

4. Banking Mitigation Credit Summary

Credits	Acres
-1355.5	#N/A

IV. Grand Totals

Credits	Acres
1504.0	52.0

Adverse Impacts Table

Mitigation Summary Worksheet For Permit Application

Impact HUC

08090201

Impact Basin

Lake Pontchartrain/Breton Sound/Chandeleur Sound

Table 1: Required Mitigation Credits Worksheet

Factor	W-14 Permanent	W-14 Temporary	Robert Blvd. and West Detention Ponds	Area 4	Area 5	Area 6
Priority Category	Secondary 2	Secondary 2	Secondary 2	(Select an Option) 0	(Select an Option) 0	(Select an Option) 0
Existing Vegetative Condition	Class 3 1	Class 3 1	Class 2 2.4	(Select an Option) 0	(Select an Option) 0	(Select an Option) 0
Existing Hydrologic Condition	Class 4 0.5	Class 4 0.5	Class 3 1	(Select an Option) 0	(Select an Option) 0	(Select an Option) 0
Duration	Over 10 1	1 to 3 0.1	Over 10 1	(Select an Option) 0	(Select an Option) 0	(Select an Option) 0
Dominant Impact	Dredge 2.5	Dredge 2.5	Drain 2	(Select an Option) 0	(Select an Option) 0	(Select an Option) 0
Cumulative Impact	Low 0.02	Low 0.02	Low 0.02	(Select an Option) 0.00	(Select an Option) 0.00	(Select an Option) 0.00
Sum of r Factors	7.0	6.1	8.4	0.0	0.0	0.0
Size in Acres	3.0	4.4	12.0	0.0	0.0	0.0
R × AA=	20.8	26.6	101.0	0.0	0.0	0.0

Credits Impacted by Project = $\sum (R \times AA) =$

148.5

Table 2A: Mitigation to be Performed at an Existing Mitigation Bank/Area

Selected Bank/Area

(No Bank Selected)

Bank HUC

#N/A

HUC's Included in Banks Service Area

#N/A

Impacted HUC

08090201

Does impact occur within the Bank's Service Area

(Yes or No)

Out of Basin Factor

#N/A

Complete the mitigation worksheet for the bank by determining whether or not the mitigation is in-kind and whether or not the impact occurs within the same watershed as the mitigation.

Factors		
Kind	(select an option)	0.0
Location	(select an option)	0.0
Sum of m Factors		0.0

Table 2B: Proposed Restoration/Enhancement Mitigation Worksheet

Site-Specific Mitigation Site Name:

Mitigation Project HUC: 08090201
Mitigation Project Basin: Lake Pontchartrain/Breton Sound/Chandeleur Sound
Impacted HUC: 08090201
Mitigation Project in the same basin as the impact: Yes
Proximity Factor: 1

	Factors	Blossman	Elmwood	Blossman #2	Mentab	Area 5
Net Improvement	Mitigation Type	Enhancement I 2.4	Enhancement I 2.4	Enhancement I 2.4	Enhancement I 2.4	(Select an Option) 0
	Maintenance/ Management Requirement	Active Vegetative Manipulation 0.8	Active Vegetative Manipulation 0.8	Active Vegetative Manipulation 0.8	Active Vegetative Manipulation 0.8	(Select an Option) 0
Negative Influences on the mitigation site	Commercial/Residential Development	No Impact	No Impact	No Impact	No Impact	No Impact
	Oil & gas activities	No Impact	No Impact	No Impact	No Impact	No Impact
	Size	area >500 acres	area >500 acres	area >500 acres	area >500 acres	area >500 acres
	Utility Corridors	No Impact	No Impact	No Impact	No Impact	No Impact
	Transportation	No Impact	No Impact	No Impact	Slight	No Impact
		0	0	0	-0.1	0
	Control	Transfer Fee Title Cor 0.6	(Select an Option) 0			
	Temporal Lag	0 to 5 0	0 to 5 0	10 to 20 -0.2	0 to 5 0	(Select an Option) 0
	Credit Schedule	Schedule 3 0.2	Schedule 3 0.2	Schedule 3 0.2	Schedule 3 0.2	(Select an Option) 0
	Kind	Category 1 0.4	Category 1 0.4	Category 1 0.4	Category 1 0.4	(Select an Option) 0
	Location Relative to Impact	Zone 2 0.3	Zone 2 0.3	Zone 2 0.3	Zone 2 0.3	(Select an Option) 0
	Sum of m Factors	3.42	3.42	3.22	3.32	0
	Size in Acres	52.0	36.0	41.6	322.0	0.0
	M × A=	177.8	123.12	133.952	1069.04	0
Acreeage required for Site-Specific Mitigation project using required credits calculated in Adverse impact Worksheet	43.4	0.0	0.0	0.0	#DIV/0!	
Total Restoration/Enhancement Credits = $\sum (M \times A) =$						1504.0

MEMORANDUM

DATE: November 16, 2011

TO: File

FROM: Karen Soileau

SUBJECT: W-14 Canal MCM Variable Justification

Required Mitigation Credits Worksheet:

Column 1: W-14 Canal Permanent Impacts

Priority Category:	Secondary – mixed pine/hardwood forest
Existing Vegetative Condition:	Class 3 – severely fragmented
Existing Hydrologic Condition:	Class 4 – major drainage canal that effectively removes water from distant areas and adjacent wetlands
Duration:	Over 10 – long-term impacts are proposed
Dominant Impact:	Dredge – excavating
Cumulative Impact:	Low – upgrade of existing canal to provide for increased flood protection
Size in Acres:	2.97 [see October 25, 2011 e-mail attachment from the COE titled “W-14 Canal – Acreages and Impacts (Not Including Work Completed by Others)”]

Column 2: W-14 Canal Temporary Impacts

Priority Category:	Secondary – mixed pine/hardwood forest
Existing Vegetative Condition:	Class 3 – severely fragmented
Existing Hydrologic Condition:	Class 4 – major drainage canal that effectively removes water from distant areas and adjacent wetlands
Duration:	1 to 3 – only temporary construction impacts are associated with this acreage
Dominant Impact:	Dredge – excavating
Cumulative Impact:	Low – upgrade of existing canal to provide for increased flood protection
Size in Acres:	4.35 [see October 25, 2011 e-mail attachment from the COE titled “W-14 Canal – Acreages and Impacts (Not Including Work Completed by Others)”]

Column 3: Robert Blvd. and West Detention Ponds

Priority Category:	Secondary – mixed pine/hardwood forest
Existing Vegetative Condition:	Class 2 – some level of disturbance (e.g. hurricane impacts) and lack of fire, however, ponds contiguous with larger forested tracts

Existing Hydrologic Condition:	Class 3 – minor restoration activities needed to restore hydrologic functions
Duration:	Over 10 – long-term impacts are proposed
Dominant Impact:	Drain – excavating
Cumulative Impact:	Low – excavation of detention ponds, not expected to exacerbate development
Size in Acres:	12.0 [see October 25, 2011 e-mail attachment from the COE titled “W-14 Canal – Acreages and Impacts (Not Including Work Completed by Others)”]

RESULTS: IMPACTS TO BE MITIGATED = 19.32 ACRES = 148.5 CREDITS

Proposed Restoration/Enhancement Mitigation Worksheet:

Column 1: Blossman Tract

Mitigation Type:	Enhancement 1 – site would be managed as a pine savannah via hardwood midstory removal, prescribed fire, and planting of longleaf pine
Maintenance/Management:	Active Vegetative Manipulation – ongoing fire management necessary
Development:	No Impact – no development bordering site
Oil & Gas Activities:	No Impact – no prospects
Size:	Area \geq 500 acres – site adjacent to Big Branch Marsh NWR
Utility Corridors:	No Impact – no maintained ROWs on the property
Transportation:	No Impact – site not bounded by road
Control:	Conservancy – transferring title to Big Branch Marsh NWR
Temporal Lag:	0 to 5 years – reduced time to replace pine savannah functions because large pine trees exist on-site. Hardwood midstory removal, tallow control, prescribed fire, and tree planting in some areas is necessary.
Credit Schedule:	Schedule 3 – appropriate for most Civil Works projects
Kind:	Category 1 – in-kind, site historically pine savannah
Location Relative to Impact:	Zone 2 – impact and mitigation occur within the same HUC
Size in Acres:	52.0 – size of tract

Column 2: Elmwood Tract

Mitigation Type:	Enhancement 1 – site would be managed as pine savannah via hardwood midstory removal, prescribed fire, and planting of longleaf pine
Maintenance/Management:	Active Vegetative Manipulation – ongoing fire management necessary

Development:	No Impact – no development bordering site
Oil & Gas Activities:	No Impact – no prospects
Size:	Area \geq 500 acres – site adjacent to Big Branch Marsh NWR
Utility Corridors:	No Impact – no maintained ROWs on the property
Transportation:	No Impact – site not bounded by road
Control:	Conservancy – transferring title to Big Branch Marsh NWR
Temporal Lag:	0 to 5 years – reduced time to replace pine savannah functions because large pine trees exist on-site. Hardwood midstory removal, tallow control, prescribed fire, and tree planting in some areas is necessary.
Credit Schedule:	Schedule 3 – appropriate for most Civil Works projects
Kind:	Category 1 – in-kind, site historically pine savannah
Location Relative to Impact:	Zone 2 – impact and mitigation occur within the same HUC
Size in Acres:	36.0 – size of tract

Column 3: Blossman #2

Mitigation Type:	Enhancement 1 - site would be managed as pine savannah via thinning, prescribed fire, and tallow control
Maintenance/Management:	Active Vegetative Manipulation – ongoing fire management necessary
Development:	No Impact – no development bordering site
Oil & Gas Activities:	No Impact – no prospects
Size:	Area \geq 500 acres – site adjacent to Big Branch Marsh NWR
Utility Corridors:	No Impact – no maintained ROWs on the property
Transportation:	No Impact – site not bounded by road
Control:	Conservancy – transferring title to Big Branch Marsh NWR
Temporal Lag:	10 to 20 – immature pine on-site, therefore, would take longer to replace pine savannah functions than other tracts
Credit Schedule:	Schedule 3 – appropriate for most Civil Works projects
Kind:	Category 1 – in-kind, site historically pine savannah
Location Relative to Impact:	Zone 2 – impact and mitigation occur within the same HUC
Size in Acres:	41.6 – size of tract

Column 4: Mentab

Mitigation Type:	Enhancement 1 – site would be managed as pine savannah via hardwood midstory removal, prescribed fire, and longleaf pine planting
Maintenance/Management:	Active Vegetative Manipulation – ongoing fire management necessary
Development:	No Impact - no development bordering site
Oil & Gas Activities:	No Impact – no prospects
Size:	Area ≥ 500 acres – site adjacent to Big Branch Marsh NWR
Utility Corridors:	No Impact – no maintained ROWs on the property
Transportation:	Slight – unimproved road borders site
Control:	Conservancy – transferring title to Big Branch Marsh NWR
Temporal Lag:	0 to 5 years – reduced time to replace pine savannah functions because large pine trees exist on-site. Hardwood midstory removal, prescribed fire, and tree planting in some areas is necessary.
Credit Schedule:	Schedule 3 – appropriate for most Civil Works projects
Kind:	Category 1 – in-kind, site historically pine savannah
Location Relative to Impact:	Zone 2 – impact and mitigation occur within the same HUC
Size in Acres:	322.0 – size of tract

RESULTS: TOTAL OF ALL POTENTIAL MITIGATION PROJECT SITES = 451.6 ACRES = 1504.0 CREDITS

Obviously, it would not be necessary to restore all of these sites to satisfy the anticipated mitigation requirements for this project. Restoration of all of these sites would generate 1,256.2 more credits than is needed to compensate for project impacts. We strongly urge the Corps to consult with the FWS Southeast Louisiana Refuge Complex to determine their priorities and preferences regarding the acquisition and restoration of these sites, such that the most environmentally preferable group of sites (or portions of sites) can be selected for restoration.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Region 6

**1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733**

January 3, 2012

Mr. Richard Boe
U.S. Army Corps of Engineers
Regional Planning and Environment Division South
New Orleans Environmental Branch
CEMVN-PDC-CEC
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Mr. Boe:

In accordance with our responsibilities under Section 309 of the Clean Air Act (CAA) and the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) Region 6 has reviewed the Supplemental Environmental Assessment (SEA) and draft Finding of no Significant Impact (FONSI) titled Southeast Louisiana (SELA) St. Tammany, W-14 Canal Project. The proposed action would reduce the risk of flooding and drainage issues to human life and economic infrastructure within the W-14 Canal drainage basin, in the city of Slidell, Louisiana.

EPA offers the following comments for your consideration in preparation of the Final EA.

Page 14 of the SEA includes prime and unique farmlands in a list of resources not affected by the alternatives under consideration. There are two areas within the project site considered prime farmland. According to the Farmland Protection Policy Act of 1981 (FPPA), this requires coordination with the National Resource Conservation Service (NRCS) State of Louisiana soil conservationist to analyze project impacts and potential mitigation measures. Please provide your coordination letter and the NRCS response in the Final EA.

The Draft Environmental Assessment (DEA) contains a discussion of noise, but the SEA does not. Large construction and renovation equipment will be used in the proposed alternative and the auditory effects of this equipment should be quantified in the SEA. In the final EA please describe how the proposed action will impact noise levels surrounding the project area. EPA encourages U.S. Army Corps of Engineers to require best management practices be used for noise reduction in sensitive areas.

We appreciate the opportunity to provide comments for the SEA. Should you have any questions or concerns regarding this letter, do not hesitate to contact Keith Hayden of my staff, at 214-665-2133 or hayden.keith@epa.gov for assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Rhonda Smith".

Rhonda Smith
Chief, Office of Planning and
Coordination

Final Model Review Report for the Modified Charleston Method for the Southeast Louisiana Urban Flood Control Project, W-14 Canal, St. Tammany Parish, Louisiana

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration/Coastal Storm Damage Reduction
Planning Centers of Expertise
Baltimore District

Contract No. W911NF-07-D-0001
Task Control Number: 10-081
Delivery Order: 0888

July 2, 2010



SHORT-TERM ANALYSIS SERVICE (STAS)

on

Final Model Review Report

**Modified Charleston Method for the Southeast Louisiana Urban Flood Control Project,
W-14 Canal, St. Tammany Parish, Louisiana**

by

**Battelle
505 King Avenue
Columbus, OH 43201**

for

**Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration/Coastal Storm Damage Reduction
Planning Centers of Expertise
Baltimore District**

July 2, 2010

**Contract No. W911NF-07-D-0001
Task Control Number: 10-081
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Scientific Services Program

The views, opinions, and/or findings contained in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.

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**FINAL
MODEL REVIEW REPORT
for the
Modified Charleston Method for the Southeast Louisiana Urban Flood Control
Project, W-14 Canal, St. Tammany Parish, Louisiana**

EXECUTIVE SUMMARY

The Southeast Louisiana (SELA) Flood Control project was authorized by the Fiscal Year 1996 Energy and Water Development Appropriations Act, Public Law 104-46 (Section 108) and the Water Resources Development Act (WRDA) of 1996, Public Law 104-303 (Section 533). The Acts state that the Secretary of the Army shall proceed with engineering, design, and construction of projects to provide for flood control and improvements to rainfall drainage systems in Jefferson, Orleans, and St. Tammany Parishes, Louisiana. Section 533 of WRDA authorizes SELA projects for construction without preparation of a feasibility report, but requires that the plan must be shown to be “technically sound, environmentally acceptable, and economic, as applicable.”

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared an Environmental Assessment (EA #409) to evaluate the potential impacts associated with the proposed design modifications and maintenance of flood damage reduction features described in the St. Tammany Parish, Louisiana Reconnaissance Study dated July 1996. EA #409 has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality’s Regulations (40 CFR §1500-1508), as reflected in the USACE Engineering Regulation, ER 200-2-2. The proposed action is located near New Orleans, Louisiana, in the City of Slidell, along the W-14 Canal drainage basin, which is north of Lake Pontchartrain, south of Interstate Highway 12, east of U.S. Highway 11, and west of Interstate Highway 10. The project includes improving approximately 4.1 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, excavating two new detention ponds with overflow weirs, expanding an existing pond, installing culverts, replacing three existing bridges, and constructing a new pump station. Restoration measures would be implemented to reduce visual impacts by replanting trees and other vegetation to as near pre-project conditions as practicable.

The purpose of the proposed action is to reduce the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin, in the City of Slidell in southeast Louisiana. The western portion of the Slidell area floods primarily from heavy rainfall and the inability of the existing drainage network to handle the resulting flows. The eastern portion of the Slidell area floods primarily from high water stages in the nearby Pearl River. Major flooding has occurred in the Slidell area due to heavy rainfall events, tropical storms, hurricanes, and high water stages on the Pearl River. On August 29, 2005, Hurricane Katrina caused major damage to the Federal and non-Federal flood control and the Hurricane and Storm Damage Risk Reduction System (HSDRRS) in southeast Louisiana. Hurricane Rita followed this storm on September 24, 2005, and made landfall on the Louisiana-Texas state border, causing major damage to the HSDRRS in south Louisiana. Since these hurricanes, the CEMVN has been working with state

and local officials to restore the Federal and non-Federal flood control and HSDRRS projects and related works in affected areas.

USACE is conducting a model review of the application of the Modified Charleston Method (MCM) for the Southeast Louisiana Urban Flood Control Project, W-14 Canal, St. Tammany Parish, Louisiana 533(d) Report (MCM model review). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the MCM model review. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The MCM model review was external to the agency and conducted following procedures described in the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) (USACE, 2010); CECW-CP Memorandum *Peer Review Process* (USACE, 2007a); and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Because the successful application of the MCM is dependent upon the technical quality of the model, other guidance documents that will be provided for reference include Department of the Army, U.S. Army Corps of Engineers *Planning Models Improvement Program: Model Certification* (EC 1105-2-407) (USACE, 2005) and USACE Planning Models Improvement Programs document entitled *Protocols for the Certification of Planning Models* (USACE, 2007b).

This final report details the model review process, describes the model review panel members and their selection, and summarizes the Final Panel Comments of the model review Panel (the Panel) on the adequacy and acceptability of the MCM model for quantifying potential impacts to fish and wildlife resources in the pine-savanna habitat type and for evaluating mitigation alternatives. The model review shall be limited to technical review and will not involve USACE or other Federal policy review.

Three panel members were selected for the model review from 16 identified candidates. The candidates for the Panel were evaluated based on their technical expertise in the following key areas: forested wetland ecology, wetland habitat assessment, and spreadsheet auditing. These areas correspond to the technical content of the MCM model and overall scope of the W-14 Canal project. USACE was given the opportunity to review the panel prior to Battelle establishing subcontracts with them.

The Panel received electronic versions of the MCM model review documents, along with a charge that solicited its comments on specific sections of the documents to be reviewed. The MCM Project Delivery Team briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review. Other than this teleconference, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 130 individual comments in response to the 21 charge questions.

Panel members reviewed the MCM model review documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using the following four-part format: (1) a comment statement; (2) the basis for the comment; (3) the

significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 12 Final Panel Comments were identified and documented. Of these, eight were identified as having high significance and four had medium significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 12 Final Comments Identified by the MCM Model Review Panel

Significance – High	
1	Due to the architecture of the Modified Charleston Method (MCM) model Workbook, there are many opportunities for errors to be made during user data entry.
2	Due to the architecture of the MCM model Workbook, there are many opportunities for errors to be made during development and maintenance.
3	The security of the MCM model Workbook is easily breached.
4	Under certain circumstances, the MCM model Workbook produces erroneous results due to existing errors and typographic mistakes.
5	For some of the factors addressed in the Workbook, the <i>r</i> and <i>m</i> values for each option appear to vary substantially, seem arbitrarily assigned, and it is unclear whether the scale is appropriate.
6	Combining ecological-related factors with the programmatic-related factors in the MCM worksheets makes it difficult to determine if ‘no-net-loss of function’ objectives are being met.
7	It appears that the MCM model Workbook has not been tested for internal accuracy and precision and that the model has not been tested to determine if it meets USACE programmatic objectives.
8	Specific important metadata about the MCM model has not been included in either the Workbook or the Guidebook.
Significance – Medium	
9	It is not clear whether the implicit assumptions related to assessing ecological factors in the MCM worksheets are valid.
10	The architecture of parts of the Workbook makes it difficult to use and not transparent, perhaps impacting user confidence, overall usability, and maintainability.
11	The references to figures, worksheets, and terminology in the Guidebook are not in correspondence with the Workbook.
12	The MCM model Workbook contains implicit assumptions that compensatory mitigation projects will be successful over the long term, and fails to account for risk that might undermine long-term success.

The model review panel members agreed on the adequacy and acceptability of the MCM model for quantifying potential impacts to fish and wildlife resources in the pine-savanna and coastal salt marsh habitat types and for evaluating mitigation alternatives. The following statements summarize the Panel’s findings, which are described in the Final Panel Comments (Table 3) and discussed in more detail in Appendix A.

Environmental:

The MCM takes into account the watershed in which the adverse impacts and restoration activities occur, which is beneficial in that restoration efforts that are in-kind and within the same geographic area are favored. Another strength of the MCM includes that it does a reasonable job tracking gains and losses in condition in relation to compensatory mitigation, particularly if more robust methods are used to support the factor scores chosen for evaluating condition. One weakness of the MCM is that it would be difficult to use the methodology to assess whether compensation has adequately met “no-net-loss” objectives, because the scores for factors that assess condition are combined with scores that assess programmatic needs in determining mitigation and restoration credits. If the factors that assess condition and the factors that assess programmatic success were compiled independently of one another, the MCM method would be much more useful in determining if no-net-loss in function and area objectives were being met with regard to the W-14 Canal project.

While the MCM worksheets appear to be easy to use, the ecological justification for the values in those menus is not presented. Many of the choices available to the user seem arbitrary, which can undermine user confidence and perhaps negatively impact the programmatic requirement of no-net-loss of wetlands. This tool has great potential but should be improved with documentation and justification. Further, the inability of the model in its current form to incorporate probability of failure is an important limitation.

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The MCM Workbook and Guidebook together are a good example of a custom-built Excel-based software tool intended to serve a specialized user community that would otherwise remain underserved. After the Workbook is tested, debugged, fully documented and restructured for better usability, maintainability and user support, it should be capable of fulfilling its intended purpose. The MCM Workbook, as implemented, will probably suffice for users familiar with its inner workings, after it has been tested and its internal errors are corrected. However, for general use by members of the public or by those less familiar with its internal implementation, some of the attributes of the implementation of the Workbook could impair its ability to achieve its intended purpose beyond the initial release.

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LIST OF ACRONYMS

ATR	Agency Technical Review
CEMVN	USACE, Mississippi Valley Division, New Orleans District
CFR	Code of Federal Regulations
COI	Conflict of Interest
FAQ	Frequently Asked Questions
HSDRRS	Hurricane and Storm Damage Risk Reduction System
IEPR	Independent External Peer Review
MCM	Modified Charleston Method
NTP	Notice to Proceed
SELA	Southeast Louisiana
USACE	United States Army Corps of Engineers
WRDA	Water Resources Development Act

1. INTRODUCTION

The Southeast Louisiana (SELA) Flood Control project was authorized by the Fiscal Year 1996 Energy and Water Development Appropriations Act (WRDA), Public Law 104-46 (Section 108) and the Water Resources Development Act of 1996, Public Law 104-303 (Section 533). The Acts state that the Secretary of the Army shall proceed with engineering, design, and construction of projects to provide for flood control and improvements to rainfall drainage systems in Jefferson, Orleans, and St. Tammany Parishes, Louisiana. Section 533 of WRDA authorizes SELA projects for construction without preparation of a feasibility report, but requires that the plan must be shown to be “technically sound, environmentally acceptable, and economic, as applicable.”

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared an Environmental Assessment (EA #409) to evaluate the potential impacts associated with the proposed design modifications and maintenance of flood damage reduction features described in the St. Tammany Parish, Louisiana Reconnaissance Study dated July 1996. EA #409 has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality’s Regulations (40 CFR §1500-1508), as reflected in the USACE Engineering Regulation, ER 200-2-2. The proposed action is located near New Orleans, Louisiana, in the City of Slidell, along the W-14 Canal drainage basin, which is north of Lake Pontchartrain, south of Interstate Highway 12, east of U.S. Highway 11, and west of Interstate Highway 10. The project includes improving approximately 4.1 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, excavating two new detention ponds with overflow weirs, expanding an existing pond, installing culverts, replacing three existing bridges, and constructing a new pump station. Restoration measures would be implemented to reduce visual impacts by replanting trees and other vegetation to as near pre-project conditions as practicable.

The purpose of the proposed action is to reduce the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin, in the City of Slidell in southeast Louisiana. The western portion of the Slidell area floods primarily from heavy rainfall and the inability of the existing drainage network to handle the resulting flows. The eastern portion of the Slidell area floods primarily from high water stages in the nearby Pearl River. Major flooding has occurred in the Slidell area due to heavy rainfall events, tropical storms, hurricanes, and high water stages on the Pearl River. On August 29, 2005, Hurricane Katrina caused major damage to the Federal and non-Federal flood control and the Hurricane and Storm Damage Risk Reduction System (HSDRRS) in southeast Louisiana. Hurricane Rita followed this storm on September 24, 2005, and made landfall on the Louisiana-Texas state border, causing major damage to the HSDRRS in south Louisiana. Since these hurricanes, the CEMVN has been working with state and local officials to restore the Federal and non-Federal flood control and HSDRRS projects and related works in affected areas.

The objective of the work described here was to conduct a review of the application of the Modified Charleston Method (MCM) for the Southeast Louisiana Urban Flood Control Project,

W-14 Canal, St. Tammany Parish, Louisiana 533(d) Report (MCM model review) in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) (USACE 2010); CECW-CP Memorandum Peer Review Process (USACE 2007a); and the Office of Management and Budget's *Final Information Quality Bulletin for Peer Review* (OMB 2004). Because the successful application of the MCM is dependent upon the technical quality of the model, other guidance documents that will be provided for reference include Department of the Army, U.S. Army Corps of Engineers *Planning Models Improvement Program: Model Certification* (EC 1105-2-407) (USACE 2005) and USACE Planning Models Improvement Programs document entitled *Protocols for the Certification of Planning Models* (USACE 2007b). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the MCM model review. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the model review process, describes the model review panel members and their selection, and summarizes the Final Panel Comments of the model review Panel on the adequacy and acceptability of the MCM model for quantifying potential impacts to fish and wildlife resources in the pine-savanna habitat type and for evaluating mitigation alternatives. The model review shall be limited to technical review and will not involve USACE or other Federal policy review. Detailed information on the Final Panel Comments is provided in Appendix A.

2. PURPOSE OF THE MODEL REVIEW

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses independent external peer review to complement the Agency Technical Review (ATR), as described in USACE (2010) and USACE (2007).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. Peer review provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the peer review addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the peer review of the MCM model application to the W-14 Canal Project (MCM model review) was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting model reviews for USACE.

3. METHODS

This section describes the methodology followed in selecting the members for the model review panel (the Panel) and in planning and conducting the MCM model review. The model review

was conducted following procedures described in USACE (2010) and in accordance with USACE (2005, 2007a, and 2007b) and OMB (2004). Supplemental guidance on evaluation for conflicts of interest was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the model review process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 defines the schedule followed in executing the model review. Due dates for milestones and deliverables are based on the NTP date of April 20, 2010. Note that the work items listed in Task 7 occur after the submission of this report.

Table 1. MCM Model Review Schedule

TASK	ACTION	DUE DATE
	NTP for contract modification	4/20/2010
	Review documents available	4/20/2010
	End of Period of Performance	8/30/2010
1	USACE/Battelle Kick-off Meeting	4/22/2010
2 & 3	Battelle submits Draft Charge ^a	4/28/2010
	USACE provides comments on Draft Charge	4/30/2010
	Battelle submits Final Charge with Final Work Plan and Final Schedule ^a	5/5/2010
	USACE approves Final Work Plan, Charge, and Schedule	5/6/2010
4	Battelle provides USACE with conflicts of interest (COI)	4/22/2010
	Battelle recruits and screens up to 6 potential panel members	4/30/2010
	Battelle submits list of selected panel members ^a	4/30/2010
	USACE provides comments on panel members	5/3/2010
	Battelle completes subcontracts for model review Panel	5/17/2010
5	Review documents sent to panel	5/18/2010
	Battelle/panel Kick-off Meeting	5/24/2010
	USACE/Battelle/panel Kick-off Meeting	5/24/2010
	Model review panel completes their review	6/8/2010
	Battelle consolidates comments from panel	6/9/2010
	Battelle convenes model review teleconference	6/11/2010
	Panel provides draft Final Panel Comments to Battelle	6/21/2010
6	Battelle provides Final Model Review Report to Panel for review	6/29/2010
	Panel provides comments on Final Model Review Report	6/30/2010

TASK	ACTION	DUE DATE
	Battelle submits Final Model Review Report to USACE ^a	7/6/2010
7 ^b	Battelle convenes teleconference to discuss USACE clarifying questions on Final Model Review Report	7/15/2010
	Project Closeout	9/8/2010

^a Deliverable

^b Task occurs after the submission of this report.

3.2 Identification and Selection of Model Review Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: forested wetland ecology, wetland habitat assessment, and spreadsheet auditing. These areas correspond to the technical content of the MCM model and overall scope of the W-14 Canal project.

To identify candidate panel members, Battelle reviewed experts in Battelle’s Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle initially identified 16 candidates for the Panel, evaluated their technical expertise, and inquired about potential conflicts of interest. Of these, Battelle chose five of the most qualified candidates and confirmed their interest and availability. Of the six candidates, three were proposed for the final Panel and two were proposed as backup reviewers. The three proposed primary reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed conflicts of interest, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or conflicts of interest.¹ These COI questions were intended to serve as a means of disclosure, and to better characterize a potential candidate’s employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the IEPR Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

¹ Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), “...when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist’s ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects.”

- Involvement by you or your firm² in any part of the Southeast Louisiana Urban Flood Control Project, W-14 Canal, including the 533(d) Report or the Environmental Assessment.
- Involvement by you or your firm² in any work related to the Modified Charleston Method (MCM) assessment model.
- Involvement by you or your firm² in any work related to flood control and improvements to rainfall drainage systems projects in the St. Tammany Parish, Louisiana.
- Involvement by you or your firm² in the conceptual or actual design, construction, or O&M of any projects for the Southeast Louisiana Urban Flood Control Project.
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Involvement with paid or unpaid expert testimony related to the Southeast Louisiana Urban Flood Control Project.
- Current or previous employment or affiliation with the non-Federal sponsors or any of the following cooperating Federal, State, County, local and regional agencies, environmental organizations, and interested groups: U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, or St. Tammany Parish government (for pay or pro bono).
- Past, current, pending, or future interests (financial or otherwise) by you, your spouse or children related to the Southeast Louisiana Urban Flood Control Project, including interest in Southeast Louisiana Urban Flood Control Project-related contracts or awards from USACE.
- Current personal involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are specifically involved with the New Orleans District.
- Current firm² involvement with other USACE projects, specifically those projects/contracts that are with the New Orleans District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.
- Any previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm²) within the last 10 years, notably if those projects/contracts are with the New Orleans District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning flood control or improvements to rainfall drainage systems and include the client/agency and duration of review (approximate dates).
- A significant portion (i.e., greater than 50%) of personal or firm² revenues within the last 3 years came from USACE contracts.
- Participation in relevant prior Federal studies/programs relevant to this project.
- Participation in relevant prior non-Federal studies/programs relevant to this project.

² Includes any joint ventures in which your firm is involved.

- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Southeast Louisiana Urban Flood Control Project.
- Is there any past, present or future activity, relationship or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

In selecting the final members of the Panel from the list of candidates, Battelle chose experts who best fit the expertise areas and had no conflicts of interest. The three final reviewers were either affiliated with academic institutions or consulting companies. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of conflicts of interest through a signed Conflict of Interest form. USACE was given the opportunity to review the panel prior to Battelle establishing subcontracts with them. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 5 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the model review process, the schedule, communication, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the Model Review

Battelle drafted a preliminary charge document, including specific charge questions and discussion points. The charge was prepared by Battelle to guide the Panel, according to guidance provided in USACE (2010) and OMB (2004). After it was reviewed and approved by USACE, it was sent to the Panel to guide its review of the application of the MCM model to the W-14 Canal project. The draft charge was submitted to USACE for evaluation. USACE provided comments and revisions to the draft charge, which were used to produce the final charge. The final charge was submitted to USACE for approval. In addition to a list of 21 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the model review (provided in Appendix B of this final report).

Battelle planned and facilitated a final kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the model review Panel received electronic versions of the MCM model review documents and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix B of this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

3.4 Review of Individual Comments

The Panel produced approximately 130 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle was able to summarize the 130 comments into a preliminary list of 12 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 Model Review Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the experts, many of whom are from diverse scientific backgrounds, could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments and to decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the Final Model Review Report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall negative comments, positive comments, and comments that appeared to be conflicting among panel members. In addition, Battelle confirmed each comment's level of significance to the Panel, added any missing issues of high-level importance to the findings, resolved whether to "agree to disagree" on the conflicting comments, and merged any related individual comments.

The Panel also discussed responses to two specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel; each comment was determined to be a non-significant issue (i.e., a true disagreement did not exist).

At the end of these discussions, the Panel identified 12 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared for the Panel a summary memorandum documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the MCM model review:

- **Lead Responsibility:** For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed merged individual comments in the comment-response form table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and a template for the preparation of the Final Panel Comments.
- **Directive to the Lead:** Each lead was encouraged to communicate directly with other Panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- **Format for Final Comments:** Each Final Panel Comment was presented as part of a four-part structure:
 1. Comment Statement (succinct summary statement of concern)
 2. Basis for Comment (details regarding the concern)
 3. Significance (high, medium, low; see description below)

4. Recommendation for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
 1. High: Describes a fundamental problem with the model(s) that could affect its/their ability to serve its/their intended purpose
 2. Medium: Affects the completeness or understanding of the model(s), model usability, or the level of performance of the model(s)
 3. Low: Affects the technical quality of the model documentation but will not affect the performance of the model(s)
 - Guidance for Developing the Recommendation: The recommendation was to include specific actions that the USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 12 Final Panel Comments were prepared and assembled. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (which were screened for availability, technical background, and conflicts of interest), provided it to USACE, and Battelle made the final selection of panel members.

An overview of the credentials of the final three members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. MCM Model Review Panel: Technical Criteria and Areas of Expertise

	Battaglia	Rheinhardt	Brenner
Forested Wetland Ecology (one expert needed)	X		
Minimum 5 years of experience in the ecology of freshwater forested wetlands of the southeastern U.S.	X	X	
Familiar with large, complex civil works projects with high public and interagency interests		X	
Wetland Habitat Assessment (one expert needed)		X	
Minimum 5 years of experience working with one or more of the following habitat assessment methods:		X	
Habitat Evaluation Procedures		X	
Hydrogeomorphic Methodology		X	
Wetland Value Assessment			
Spreadsheet Auditing (one expert needed)			X
Minimum 5 years of experience working with industry standard spreadsheet software, especially the ability to analyze formulas used for complex calculations		X	X

Loretta Battaglia

Role: This panel member was chosen primarily for her forested wetland ecology experience and expertise.

Affiliation: Southern Illinois University—Carbondale

Loretta Battaglia is currently an associate professor in the plant biology department at Southern Illinois University at Carbondale and she has 22 years of experience working in the bottomland hardwood and coastal ecosystems of the southeastern United States. She earned her Ph.D. in ecology from the University of Georgia in 1998; her dissertation was entitled “Microsite heterogeneity and regeneration patterns along a post-hurricane disturbance gradient in an old-growth bottomland hardwood forest.” Dr. Battaglia also conducted her M.S. degree research through the University of Louisiana at Monroe on bottomland hardwood forest succession. She is responsible for several long-term research programs in coastal Louisiana which include forested wetlands and their dynamics in response to coastal subsidence. She is particularly interested in the effects of disturbance (including invasive species and storms) and climate change on wetland ecosystems. She has been awarded numerous research grants, including an examination of invasive species assemblages across restored floodplain forests and the development of indicators of southern bottomland hardwood forest conditions. Dr. Battaglia has published (or is preparing) several papers focusing on the community structure, function, and dynamics of forested wetlands in this region^{1,2,3}. She is a coordinating editor for *Restoration Ecology* and has been an Associate Editor for *Wetlands*. Dr. Battaglia is the president-elect of the north central chapter of the Society of Wetland Scientists.

¹ Nelson, J. L., J. W. Groninger, L. L. Battaglia and C. M. Ruffner. 2010. Regeneration response to tornado and salvage harvesting in a bottomland forest. *Proceedings of the 14th Biennial Southern Silvicultural Research Conference*, Athens, GA.

² Battaglia, L. L., P.R. Minchin and D. W. Pritchett. 2002. Sixteen years of old-field succession and reestablishment of a bottomland hardwood forest in the Lower Mississippi Alluvial Valley. *Wetlands* 22: 1-17.

³ Barko, V. A., L. L. Battaglia and D. E. Henderson. In preparation. Invasive plant species in Mississippi River bottomland hardwood forests: threats to restoration success. *Forest Ecology and Management*.

Richard Rheinhardt

Role: This panel member was chosen primarily for his wetland habitat assessment experience and expertise.

Affiliation: East Carolina University and independent consultant

Richard Rheinhardt is currently an independent consultant and a research associate professor in the biology department at East Carolina University. He earned his Ph.D. in marine science and biological oceanography from the College of William and Mary’s Virginia Institute of Marine Science in 1991. Dr. Rheinhardt is a member of the original team that developed the Hydrogeomorphic (HGM) approach to wetland assessment. He co-authored the first National HGM Guidebook (for riverine wetlands) and was a primary author of a Regional HGM Guidebook for assessing wet pine flats on mineral soils. He has conducted training for and provided technical advice on reference-based wetland assessment approaches, including HGM, to federal, state, and private sector resource managers throughout the United States. He is currently a member of a team developing a Regional HGM Guidebook for riverine wetlands for the Gulf and Atlantic coastal plans, which involves collecting reference field data for the Virginia, North Carolina, and South Carolina part of the reference domain. Dr. Rheinhardt’s

experience with civil works projects includes research evaluating the effectiveness of existing North Carolina Department of Transportation (NCDOT) wetland mitigation sites. Also for the NCDOT, he designed methods and conducted an HGM wetland assessment for the mitigation of a fen wetland in the Piedmont of North Carolina. Dr. Rheinhardt has researched the role of reference wetlands in functional assessment, mitigation, and restoration. While a senior biologist with the U.S. Fish and Wildlife Service, he contributed to numerous environmental impact statements and has also conducted research on the impacts of nutrient enrichment in tidal salt and freshwater marshes. Dr. Rheinhardt has published over 25 peer-review manuscripts, four book chapters, and more than 15 major reports related to wetland ecology and plant ecology, primarily on ecosystems in the Southeast. He is a member of the Society of Wetland Scientists, Society for Ecological Restoration, and Torrey Botanical Society and has served as peer reviewer for 10 journals over 25 years.

Richard Brenner

Role: This panel member was chosen primarily for his spreadsheet auditing experience and expertise.

Affiliation: Chaco Canyon Consulting

Richard Brenner is currently the owner and principal of Chaco Canyon Consulting, a multi-purpose consulting firm that includes spreadsheet services such as auditing and programming. He earned his M.S. degree in electrical engineering from the Massachusetts Institute of Technology in 1971 and he has been working extensively with industry standard spreadsheet software (e.g., Microsoft Excel) since 1987. For the past 17 years, he has been an instructor at the Harvard University Extension School where he teaches “Spreadsheet Models for Managers.” This course covers a variety of spreadsheet-related topics, including array formulas, correcting errors (e.g., circular references), and matrix multiplication. Beginning in the 2010-2011 academic year, the course will be opened to worldwide distance learners and will include a new unit on peer reviews of spreadsheet models. Since 1987, he has worked as a business consultant, developing dozens of financial models and market models and tools in Microsoft Excel for a variety of clients. In 2005-2006, he provided spreadsheet model development services for a client working for Microsoft on market models and tools for the mobile computing market. Mr. Brenner has excellent mathematical skills, having been a Ph.D. candidate in theoretical particle physics at the California Institute of Technology; he left his studies there to pursue an opportunity to commercialize Macsyma, a pioneering symbolic computer mathematics system. His paper, “Simplifying Large Algebraic Expressions by Computer,” appeared in Proceedings of the 1984 MACSYMA Users’ Conference. Mr. Brenner has experience conducting (and training others to conduct) technical reviews of commercial software and in conducting technical peer reviews of spreadsheet models.

5. SUMMARY OF FINAL PANEL COMMENTS

The model review panel members agreed on the adequacy and acceptability of the MCM model for quantifying potential impacts to fish and wildlife resources in the pine-savanna habitat type and for evaluating mitigation alternatives. The following statements summarize the Panel’s findings, which are described in the Final Panel Comments (Table 3) and discussed in more detail in Appendix A.

Environmental:

The MCM takes into account the watershed in which the adverse impacts and restoration activities occur, which is beneficial in that restoration efforts that are in-kind and within the same geographic area are favored. Another strength of the MCM includes that it does a reasonable job tracking gains and losses in condition in relation to compensatory mitigation, particularly if more robust methods are used to support the factor scores chosen for evaluating condition. One weakness of the MCM is that it would be difficult to use the methodology to assess whether compensation has adequately met “no-net-loss” objectives, because the scores for factors that assess condition are combined with scores that assess programmatic needs in determining mitigation and restoration credits. If the factors that assess condition and the factors that assess programmatic success were compiled independently of one another, the MCM method would be much more useful in determining if no-net-loss in function and area objectives were being met with regard to the W-14 Canal project.

While the MCM worksheets appear to be easy to use, the ecological justification for the values in those menus is not presented. Many of the choices available to the user seem arbitrary, which can undermine user confidence and perhaps negatively impact the programmatic requirement of no-net-loss of wetlands. This tool has great potential but should be improved with documentation and justification. Further, the inability of the model in its current form to incorporate probability of failure is an important limitation.

Spreadsheet:

The MCM Workbook and Guidebook together are a good example of a custom-built Excel-based software tool intended to serve a specialized user community that would otherwise remain underserved. After the Workbook is tested, debugged, fully documented and restructured for better usability, maintainability and user support, it should be capable of fulfilling its intended purpose. The MCM Workbook, as implemented, will probably suffice for users familiar with its inner workings, after it has been tested and its internal errors are corrected. However, for general use by members of the public or by those less familiar with its internal implementation, some of the attributes of the implementation of the Workbook could impair its ability to achieve its intended purpose beyond the initial release.

Table 3 lists the 12 Final Panel Comment statements by level of significance.

Table 3. Overview of 12 Final Panel Comments Identified by the MCM Model Review Panel

Significance – High	
1	Due to the architecture of the Modified Charleston Method (MCM) model Workbook, there are many opportunities for errors to be made during user data entry.
2	Due to the architecture of the MCM model Workbook, there are many opportunities for errors to be made during development and maintenance.
3	The security of the MCM model Workbook is easily breached.
4	Under certain circumstances, the MCM model Workbook produces erroneous results due to existing errors and typographic mistakes.

5	For some of the factors addressed in the Workbook, the <i>r</i> and <i>m</i> values for each option appear to vary substantially, seem arbitrarily assigned, and it is unclear whether the scale is appropriate.
6	Combining ecological-related factors with the programmatic-related factors in the MCM worksheets makes it difficult to determine if 'no-net-loss of function' objectives are being met.
7	It appears that the MCM model Workbook has not been tested for internal accuracy and precision and that the model has not been tested to determine if it meets USACE programmatic objectives.
8	Specific important metadata about the MCM model has not been included in either the Workbook or the Guidebook.
Significance – Medium	
9	It is not clear whether the implicit assumptions related to assessing ecological factors in the MCM worksheets are valid.
10	The architecture of parts of the Workbook makes it difficult to use and not transparent, perhaps impacting user confidence, overall usability, and maintainability.
11	The references to figures, worksheets, and terminology in the Guidebook are not in correspondence with the Workbook.
12	The MCM model Workbook contains implicit assumptions that compensatory mitigation projects will be successful over the long term, and fails to account for risk that might undermine long-term success.

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APPENDIX A

Final Panel Comments

on the

Modified Charleston Method Model Review

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Final Panel Comment 1:

Due to the architecture of the Modified Charleston Method (MCM) model Workbook, there are many opportunities for errors to be made during user data entry.

Basis for Comment:

Issues that create risk of user error include lack of protection against user input error, inconsistent worksheet protection, failure to detect user error when detection is clearly possible, blank cells in drop-down lists, and Workbook file format.

a) Ten cells are available for numeric user input. They represent acreage. None of the cells has any protection against user error. There is an absence of user data entry validation.

The cells in question are not protected from user errors, including entering text instead of numeric data when numeric data is required; entering negative acreage values; and entering unrealistically large acreage values. The cells are 'Adverse Impacts Worksheet'!C25:H25 and 'Restoration-Enhancement Worksh '!D35:H35.

b) Of the eight worksheets in the Workbook, four are protected, and four are not. Unless all worksheets are protected, the user might make accidental or intentional modifications.

Modifying worksheets in unexpected ways can violate the integrity of the results, and lead to loss of alignment between the Workbook and the Guidebook.

c) There is a potential for undetected user error on multiple worksheets.

For example, there is a potential for undetected user error on 'Restoration-Enhancement Worksh '. For each area of the selected bank, the option "Size," which indicates the total size of the selected area of the bank, must be selected by the user. Users are also required to enter the size of the segment of that area of the Bank that they intend to use for their project. Clearly, the size the user enters must be less than the total size of that area of the bank, but the worksheet does not alert the user if this is not the case.

d) Users are able to evade validations by means of copy-and-paste, fill, drag-and-drop, and other similar operations, even when the worksheet is protected.

To demonstrate this, activate the worksheet 'Mitigation From Bank Worksheet ', which happens to be the only worksheet protected in the reviewed Workbook. Select cell D9. Copy it and paste into cell D4. The result of such actions can be unpredictable and erroneous results calculated by the Workbook, including the mysterious appearance of error values. There is no warning in the Guidebook alerting users to the danger of pasting onto cells that have validations.

e) Some list validations present blanks in their drop-down lists, which generate errors if users select them.

As an example, choosing one of the blanks in the drop-down list for 'Adverse Impacts Worksheet'!C6 causes C7 to display a #N/A! error. Cells with validation lists that contain blank cells include 'Adverse Impacts Worksheet'!C6; 'Adverse Impacts Worksheet'!F7; 'Mitigation From Bank Worksheet'!D4; 'Mitigation From Bank Worksheet'!F10:F11; and 'Mitigation From Bank Worksheet'!H10:H11.

f) The Workbook was saved with property Read Only Recommended.

"Read Only Recommended" does not prohibit the user from opening the Workbook with write access. The recommended approach to achieving the goal of protecting the as-distributed form of the Workbook is not to distribute it as read-only, but instead to distribute it as an Excel template.

Significance – High:

The results computed by a Workbook that is unprotected, or one that has an unprotected sheet (even a hidden sheet), are unpredictable. Failure to detect errors leads to nonsense results.

Recommendations for Resolution:

To resolve these concerns, the Workbook would need to be modified as follows:

1. Before the workbook is released into general use, validations should be installed on the cells listed above in (a), limiting data entry to positive numeric values bounded above by appropriate ceiling values. The validations should have appropriate error messages and should reject erroneous entries.
2. All worksheets should be protected prior to release or review.
3. The released versions of the Workbook should have workbook protection.
4. A validation should be applied to the “Size in Acres” cells of ‘Restoration-Enhancement Worksh ’ to ensure that the entry is smaller than the total for that area of the bank.
5. A warning should be added to the Guidebook, advising users not to paste or fill onto cells with validations. Drag-and-drop should be disabled in the Workbook. Cells with validations should be painted with a characteristic color.
6. All validation lists should be defined so that they contain no blank cells or other illicit values, as indicated above in (e).
7. The Workbook should be distributed in template form, rather than Read Only Recommended.

Final Panel Comment 2:

Due to the architecture of the MCM model Workbook, there are many opportunities for errors to be made during development and maintenance.

Basis for Comment:

During development and maintenance phases of the lifecycle of the Workbook, errors can be introduced inadvertently. The implementation of the Workbook employs practices that enhance the risk of introduction of errors during development and maintenance.

a) The Workbook fails to make use of defined names.

Defined names are especially important when making off-sheet references, during development, maintenance, and review. Defined names also simplify formulas and make them more readable. Until explicit cell references are replaced with names, error rates and labor costs for development and maintenance will remain high. Cells that reference off-sheet cells or off-sheet ranges by means of explicit cell references include 'Summary Worksheet'!(H5,H6,H7,G12,H12,E15,F15,E16,G19,H19,G22,D24); 'Restoration-Enhancement Worksh'!(D9,D11,D37,E37,F37,G37,L44); and 'Mitigation Bank Data'!(G77,G79).

b) The worksheet function SUMIF appears in many formulas in a three-argument syntax in which the last argument is redundant.

SUMIF can take either two arguments or three, depending on whether the developer desires to distinguish between the criteria range and the range being summed. When there is no need to make a distinction, the two-argument syntax is much preferred. The redundant arguments of SUMIF create the possibility for errors in development and maintenance, and increase maintenance costs. Cells using the three-argument syntax of SUMIF unnecessarily include 'Adverse Impacts Worksheet'!H28 and 'Restoration-Enhancement Worksh'!H39.

c) Some of the formulas entered into cells of the Workbook are unnecessarily complicated.

The cells 'Restoration-Enhancement Worksh'!D36, 'Adverse Impacts Worksheet'!C23:E23, and 'Adverse Impacts Worksheet'!G23:H23 contain superfluous parentheses. The cell 'Adverse Impacts Worksheet'!F23 contains a spurious call to the worksheet function SUM. The cell 'Mitigation From Bank Worksheet'!D24 contains a spurious comma in the call to SUM, and unnecessary parentheses. The formulas in five cells use the sheet-name prefix unnecessarily: 'Restoration-Enhancement Worksh'!D37:H37.

d) The Workbook uses relative references almost exclusively, even when absolute references or mixed references would have been easier and more reliable.

Many of these formulas cannot be entered in any convenient way — not by fill, not by copy-and-paste, and not by fill-on-entry. Maintenance will be difficult. If any of these formulas require modification, they will have to be modified one-by-one. Errors are already appearing due to the inappropriate use of relative references. There are 516 occurrences of this particular issue.

e) The Workbook contains several modularity violations, which create an enhanced probability of errors during the Workbook's lifecycle.

At least one such error has already occurred due to the copying of identical data into multiple ranges. It is far better practice to store only one copy of the data, and to reference that copy whenever access to that data is required. The following ranges contain supposedly identical data: (1) 'Mitigation Bank Data'!B79:B100, 'Adverse Impacts Worksheet'!F48:F69, and 'Restoration-Enhancement Worksh'!C75:C96; (2) 'Mitigation Bank Data'!A2:A34 and 'Mitigation From Bank Worksheet'!B51:B83; and

(3) 'Mitigation Bank Data'!A193:K216 and 'Restoration-Enhancement Worksh '!A44:!K67.

f) Several cells contain formulas or formula terms that compute identical quantities.

This repetition creates otherwise unnecessary maintenance requirements, and opens the possibility that during maintenance, if the computational need changes, a maintainer might fail to update all of the repetitions identically. Two quantities computed repetitiously are SUMIF('Adverse Impacts Worksheet'!C25:H25,">0") and VLOOKUP(G77,B79:C100,2).

g) The cells holding numeric parameters of the model and other numeric data (as distinguished from user data) are not protected with validations.

The only validations observed are the unlocked cells that are intended for user input. But the Workbook includes numerous cells containing parameters of the model. Over time, when cells containing model data remain unprotected, errors will eventually be introduced by maintenance and enhancement.

h) The names chosen for the worksheet tabs are likely to elevate the probability of error in development and maintenance, and degrade usability for users, developers, maintainers and reviewers.

The names chosen for the worksheet tabs are problematic in three respects: they are too long; they contain redundant information; and they contain characters other than alphanumeric and underscores.

Significance – High:

Errors introduced during development and maintenance are likely to cause future releases of the Workbook to produce inaccurate results, which could affect its ability to serve its intended purpose. High development costs could limit the rate of new releases well below the anticipated rate of one per month.

Recommendations for Resolution:

To resolve these concerns, the Workbook would need to be modified as follows:

1. Most of the existing explicit cell references should be replaced by defined names.
2. Where possible, SUMIF should appear only in its two-argument form. Instances of redundant third arguments should be corrected.
3. The sheet-name prefix should be removed in the formulas listed above in (c) where it is used unnecessarily. Redundant parentheses, redundant commas, and redundant calls to SUM should also be removed from the formulas listed above in (c).
4. In those rare instances when defined names are unsuitable, relative references should be avoided and absolute references or mixed references should be used when appropriate.
5. All modularity violations should be eliminated by using references (or, in the case of validations, chains of references) to a single copy of the data in question.
6. The repeated computations should be computed in a single cell, a name should be defined for that cell, and all formulas that now include the repeated computation should incorporate the cell's value by reference.
7. Either all cells holding numeric model parameters should be protected by means of validations, or prior to each review or release, all cells containing numeric model parameters should be programmatically checked against a locked standard by a release preparation tool.
8. The names of worksheets should be revised to address (h) above.

Final Panel Comment 3:**The security of the MCM model Workbook is easily breached.****Basis for Comment:**

Workbook security is important because it provides assurance that the results submitted by an applicant are the results the Workbook was intended to produce for a given set of user inputs. Certain attributes of the Workbook and Guidebook invite security breaches, while others make such breaches possible.

a) The Guidebook mentions hidden worksheets.

To some, mentioning hidden worksheets creates an urge to “crack” the Workbook. To others, it creates confusion. Examples are below:

- Page 27, Lines 18-19 in the Guidebook states the following: “The credit values, along with watershed information, are included in a table on the worksheet ‘Mitigation Bank Data’.”
- There is also a footnote: “The worksheet will be updated as new banks are established and existing banks are closed.”

This language should be replaced by: “The credit values, along with watershed information, are included in the computation engine in the Workbook. Updates will be provided on a regular basis by distributing updates to the Workbook.”

b) The password currently in use for worksheet protection, and presumably workbook protection, is weak.

The current password is too short and too easily guessed. Microsoft’s password checker (<http://tinyurl.com/ycdx59o>) rates the current password as “weak,” its lowest rating.

c) The Workbook is not protected.

Perhaps the most significant issue that is related to absence of workbook protection is security, especially if the Workbook is distributed to applicants, and the Workbook or its output is part of the permit application. Without workbook protection, it is possible for a determined applicant to insert a worksheet of his or her own design that displays results more favorable than those that can be obtained using the as-distributed Workbook. Detecting such a modification would require additional steps in the permitting procedures.

Moreover, the worksheet ‘Mitigation Bank Data’ is hidden in the reviewed Workbook, but it is not protected. Currently, all cells on the worksheet ‘Mitigation Bank Data’ are locked and the sheet itself is hidden. But even though a worksheet is hidden, and even though a workbook is protected, it is possible for a determined intruder to ascertain the names of all worksheets, and the values and formulas of all cells. A determined intruder can then alter the values or formulas of any unlocked cells, and any cells on unprotected worksheets. Therefore hiding a worksheet provides security against only the most naïve intruders.

A Workbook released to the public, with the ‘Mitigation Bank Data’ worksheet unprotected, will produce results that cannot be certified as valid, unless one examines all cells on that worksheet and compares them with a certified standard.

Significance – High:

Undetected breaches in Workbook security render questionable any results computed and submitted by applicants, whether in the Workbook, in hardcopy or in softcopy.

Recommendations for Resolution:

To resolve these concerns, the Workbook and Guidebook would need to be modified as follows:

1. All mention of hidden worksheets should be removed from the Guidebook, as indicated above in (a).
2. The password should be selected using recognized standards. It should be rated “strong” or better by a password checker (for example, Microsoft’s password checker at <http://tinyurl.com/ycdx59o>), and it should be changed with each new release of the Workbook.
3. The Workbook and all worksheets should be protected.

Final Panel Comment 4:

Under certain circumstances, the MCM model Workbook produces erroneous results due to existing errors and typographic mistakes.

Basis for Comment:

The Workbook contains errors of implementation, which lead to erroneous results that prevent the Workbook from fulfilling its intended purpose.

- a) There are many occurrences of VLOOKUP or HLOOKUP with a fourth argument of 0, or with no fourth argument at all. There are at least five instances of the three-argument syntax that now yield incorrect results.**

The worksheet functions VLOOKUP and HLOOKUP support two syntaxes. The three-argument syntax is legal, but fraught with risk because it can sometimes match keys approximately, rather than exactly.

Throughout the Workbook, the majority of invocations of VLOOKUP and HLOOKUP use the four-argument syntax with a fourth argument of 0. These invocations are technically in compliance with Excel's requirements, but only because Excel is automatically coercing the fourth argument, which is now 0, to FALSE. These invocations should be modified to use the correct fourth argument of FALSE.

- b) Selecting one particular bank in 'Mitigation From Bank Worksheet'!D4 leads to erroneous results.**

In the worksheet called 'Mitigation From Bank Worksheet', if one selects UPPER BAYOU FOLSE in cell D4 for the Selected Bank Area, the Bank HUC is calculated as 08070201. This is incorrect. The correct Bank HUC for UPPER BAYOU FOLSE is 08090302.

- c) The formula in cell 'Mitigation From Bank'!E84 is incorrect and gives nonsense results.**

Although the formula is incorrect, the user sees no evidence of error. Error values are suppressed because the formula uses the three-argument syntax of VLOOKUP. The formula as implemented in Excel cannot possibly represent the formula for the Proximity Factor, because, among other reasons, the argument of SQRT must be the sum of two terms.

- d) Some cells contain incorrect formulas that produce incorrect results.**

The cells are 'Adverse Impacts Worksheet'!C19, 'Adverse Impacts Worksheet'!F23, 'Mitigation Bank Data'!C162, and 'Mitigation Bank Data'!C170.

- e) Some formulas contain multiplications by factors that are demonstrably zero at all times, independent of user input.**

The range in question is 'Restoration-Enhancement Worksh '!E37:H37. It has a caption, "Acreage required for Site-Specific Mitigation project using required credits calculated in Adverse impact Worksheet".

- f) The table of HUC-to-HUC contacts in 'Mitigation Bank Data'!L1:AH22 is defective in several respects. Unless it is repaired, the Proximity Factors calculated by the Workbook are incorrect for 32 HUC-HUC pairs.**

This table is important because it is used in computing the Proximity Factor. The array must certainly possess two properties: it must be square and it must be symmetric about the main diagonal. It lacks both of these properties.

g) Until the user actually sets certain options, the model displays error values.

Here are two examples:

- Select (No Bank Selected) in 'Mitigation From Bank Worksheet'!D4. Then cells D6:E7 display error values.
- Select defaults for all factors in any column of the table on 'Restoration-Enhancement Worksh '. Then that column's row 37 displays a division by zero error.

Allowing the presence of error values when nothing is wrong eliminates their use as a signal that something *is* wrong.

h) There are two links to external files.

The Workbook contains external links to two files:

- Documents and Settings:b2odsjob:Local Settings:Temporary Internet Files:OLK21:lahuc8.xls
- Documents and Settings:B2ODSJAB:My Documents:Mitigation:ICAT:drafts:ICAT in progress.xls

Assuming that the intention is to release the Workbook to a number of users who will use the Workbook (guided by the Guidebook) in a variety of environments, it is essential that the Workbook contain no external links.

i) There is one cell that holds numeric data but does not have dependents, causing errors to result under certain specific conditions.

The following cells contain numeric data and have no dependents:

- 'Restoration-Enhancement Worksh '!G49
- 'Mitigation Bank Data'!C194

Significance – High:

Erroneous results and invalid behavior diminish the value of the Workbook.

Recommendations for Resolution:

To resolve these concerns, the Workbook would need to be modified as follows:

1. All occurrences of three-argument syntax of VLOOKUP should be replaced with the four-argument syntax with a fourth argument of FALSE, and all occurrences of the four-argument syntax should use a fourth argument of FALSE.
2. The defect noted above in (b) should be repaired before the Workbook is released.
3. The Workbook should not be released into general distribution until the defect noted above in (c) is corrected.
4. The corrections described in (d) above, or equivalent corrections, should be implemented.
5. The cells noted above in (e) should be examined and corrected if they are incorrect. If they are not incorrect – that is, if zero truly is desired – the contents of these cells should be cleared.
6. The HUC-to-HUC table should be repaired.
7. Care should be taken not to allow the generation of error values except when something is seriously wrong. Error values resulting from unset options should be masked (at the least) or better, eliminated. In the case of #DIV/0! errors, two possible solutions are:
 - Conditional formatting to suppress the display of this error.
 - Use of IF to produce a zero value when the denominator is zeroThe latter is much preferable.
8. All external links should be removed.

Final Panel Comment 5:

For some of the factors addressed in the Workbook, the r and m values for each option appear to vary substantially, seem arbitrarily assigned, and it is unclear whether the scale is appropriate.

Basis for Comment:

The r values assigned to options within the 'Adverse Impacts Worksheet' and m values within the 'Restoration-Enhancement Worksh' are major inputs into the MCM model calculations and help to determine whether restoration and enhancement will compensate for project impacts. However, the basis for the scale and class width of r and m values is not explained in the Workbook. Existing vegetation condition, for example, has 5 classes and r values that range from 3.0 to 0.1. The intervals between the different classes are uneven (e.g., a width of 0.6 between classes 1 and 2 but a width of 1.4 between classes 2 and 3). There are similar issues embedded in the 'Restoration-Enhancement Worksh'. Although in some cases, the 'm' values have even class widths for part of their range (e.g., Mitigation Types: Re-establishment 1 to Rehabilitation 2), there is no explanation presented regarding choice of the initial range. These are not isolated examples; most of the factors have different ranges and options with uneven class widths.

Some options have values that range from low to high, whereas others have options that range from high to low. The Workbook does not display category scores for negative influences and does not present values associated with the various rankings. Also, scores associated with categories of the 'Temporal Lag' factor are not displayed. For these reasons, the validity of r and m values (i.e., the main inputs of the model calculations) may be called into question because users may find their choices subjective and without scientific basis.

Based on the narrative in the Guidebook, there is no scientific justification or rationale presented for these choices. Thus, it is unclear whether the premise for the primary inputs to the model has been thoroughly evaluated.

Significance – High:

Calculations in the 'Adverse Impacts Worksheet' and 'Restoration-Enhancement Worksh' that are based on inaccurate information could affect the amount and quality of compensatory mitigation, thus compromising the programmatic objective of no-net-loss of wetlands.

Recommendations for Resolution:

To resolve these concerns, the Workbook and Guidebook would need to be modified as follows:

1. Present a section outlining the scientific background and justification for choice of r and m values being assigned for options in the 'Adverse Impacts Worksheet' and 'Restoration-Enhancement Worksh'.
2. Provide a justification for the values assigned for factor options.
3. Improve definitions of options to improve user consistency and reduce subjectivity in assigning scores.

Final Panel Comment 6:

Combining ecological-related factors with the programmatic-related factors in the MCM worksheets makes it difficult to determine if ‘no-net-loss of function’ objectives are being met.

Basis for Comment:

The MCM worksheets were intended to provide a routine mechanism for tracking project impacts and compensatory mitigation to ensure that USACE’s objectives are met regarding the Federal policy of “no-net-loss” of wetland function and area. The Guidebook states that the MCM “is an assessment method based on wetland functions.” However, only 5 of the 19 ‘factors’ used to assess wetlands can be related to wetland functional capacity or condition (Table 1); the other 14 ‘factors’ are related to programmatic objectives (values). Functions and values represent two different concepts: functions represent ecosystem processes that occur regardless of how they are valued, while values represent how important humans believe these processes are relative to public interest issues (Richardson, 1993; Smith et al., 1995; Kusler, 2010). For example, the factor ‘Location’ is used to evaluate how closely a compensatory mitigation site meets the programmatic preference that mitigations be located near to project sites, e.g., on-site mitigation (Zone 1) is favored over mitigation outside a bank’s secondary service area (Zone 4).

Table 1. Assignment of model factors in MCM as being primarily related to assessing either functions or values. Factors that characterize ecological condition are identified as assessing functions; factors that characterize policy or programmatic preferences are identified as assessing values.

Adverse Impact Factors	Type of Factor
Priority Category	Value
Existing Vegetative Condition	Function
Existing Hydrologic Condition	Function
Duration	Value
Dominant Impact	Function
Cumulative Impact	Value
Restoration-Enhancement Factors	
Mitigation Type	Function
Maintenance/ Management Requirement	Function
Commercial/Residential Development	Value
Oil & gas activities	Value
Size	Value
Utility Corridors	Value
Transportation	Value
Control	Value
Temporal Lag	Value
Credit Schedule	Value
Kind	Value
Location Relative to Impact	Value

The ability of the MCM to determine whether current programmatic needs are being met is undoubtedly useful to USACE. However, the programmatic factors were not designed to assess wetland functions. Further, programmatic needs will likely change over time, thus requiring new or revised programmatic

factors. In contrast to values, the fundamental functions that occur in wetlands do not change, even though the functional capacity of a wetland depends on the level of stress imposed upon it. These differences between wetland functions and values are the main reasons that functions and values should be assessed independently (Smith et al., 1995).

The various factor scores are used to calculate compensatory mitigation requirements, but combining the factor scores related to functions and values on both the impact and the mitigation portions of the MCM model makes it difficult to determine whether losses of wetland functions are being adequately compensated, which is the focus of no-net-loss policy. By independently summarizing the scores of the two components, changes in programmatic needs could be more easily accommodated as they evolve and ecosystem-related gains and losses could be tracked separately. In addition, the function-related factors, the scientifically defensible part of MCM, would represent the minimal amount of compensatory mitigation needed to meet the Federal policy objectives of “no overall net loss” of wetland function and area. The factors related to values (programmatic needs) could then be used to determine additional mitigation credits that would be required to meet USACE programmatic objectives (e.g., how close a mitigation site is to the project site or what organization would be the best one for managing a mitigation bank).

Some value-related factors in the MCM include a functional component and collectively the value-related factors appear to be weighted less than function-related factors. Although this weighting scheme dampens some of the overall effect of the value-related factors in the model, it still does not allow the user to separate the effects of the value-related factors from the function-related factors. A further complication is that the potential maximum and intermediate scores vary by factor and so it is not readily apparent how much a given factor might affect the final scores.

Significance – High:

Combining function-related factors with value-related factors in MCM calculations makes it difficult to determine if “no-net-loss” in function objectives are being met.

Recommendations for Resolution:

To resolve these concerns, the MCM Workbook and Guidebook would need to be modified as follows:

1. Acknowledge that MCM assesses both ecological conditions (relative to functions) and programmatic needs (values), and then identify to which category each of the factors belongs.
2. Independently summarize function-related factors and value-related factors to make the method more transparent in evaluating how well the Federal policy of “no-net-loss” of wetlands and USACE programmatic objectives are being met.

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http://www.aswm.org/propub/16_functions_6_26_06.pdf. Last accessed 6/25/10. Kusler, J.A. Common questions: definitions of the terms wetland “function” and “value.”

Final Panel Comment 7:

It appears that the MCM model Workbook has not been tested for internal accuracy and precision and that the model has not been tested to determine if it meets USACE programmatic objectives.

Basis for Comment:

As discussed in other Final Panel Comments, the Panel found many instances of spreadsheets errors that return either incorrect or nonsensical results. This led the Panel to assume that the MCM model has not been tested, since testing the Workbook would have revealed the spreadsheet errors. Testing the MCM model prior to release is necessary to assure that users obtain the same results with the same data (precision), that the Workbook models obtain the intended results (accuracy), and that the model output provides results that are useful for meeting USACE mitigation objectives in general, and W-14 Canal project objectives specifically. If different users obtain the same results with the same set of data, then one could be confident that future users will obtain consistent results and that compensatory mitigation will be consistently applied to all projects.

Obtaining consistent results (precision) is important because project proponents who use the method will likely vary widely in expertise. The likelihood of two users obtaining inconsistent results is currently high because the scaling of scores varies substantially among factors, scores are not weighted equitably among factors, and scores rely largely on subjective interpretation when choosing categories. Given that there are various opportunities for inconsistencies to occur, it is important that the Guidebook be tested for user consistency.

Testing for internal accuracy of the model is particularly important to make sure that the model returns intended results. However, the Panel assumes that the MCM model was not tested for accuracy, since the Guidebook did not state that the model development team ran tests with real or simulated data.

The MCM model is more than a functional assessment method because it also assesses wetlands relative to programmatic and planning needs. Therefore, the model should have been tested to ensure that it is capable of meeting all of USACE's programmatic needs as well as its regulatory mandates.

Significance – High:

The lack of testing prevents users from understanding the degree to which the Guidebook and Workbook models will perform as intended.

Recommendations for Resolution:

To resolve these concerns, the MCM method would need to be modified as follows:

1. The model should be tested for consistency among users.
 - Several groups of users should use the same database or field sites to determine if they obtain similar answers when selecting options for factors and to determine how closely their answers correspond to factor categories assigned by experts. Some threshold of acceptable similarity should be established (e.g., within 10% of expert score in advance of any tests).
2. The model should be tested for internal accuracy in the spreadsheets.
 - Test suites should be developed. The results of those tests should be computed by some independently verifiable means. Further, such test suites should be included in future packages for review and the Workbook should be subjected to those tests (and pass them) immediately prior to each review or release. There are five very basic items that a test suite should include:
 - i. The Workbook exactly reproduces the examples used in the Guidebook.
 - ii. The Workbook produces no error values.
 - iii. The Workbook produces no circular reference errors.
 - iv. The Workbook meets a set of defined security standards.

- v. The Workbook produces numerical results consistent with those expected in a defined set of test cases.
3. The model should be tested for overall usefulness in meeting USACE short- and long-term objectives.
- Historic data (or extant data) should be used to determine whether model performance is acceptable. For example, under various scenarios, the model could be tested to determine whether it would identify sufficient mitigation credits of acceptable quality and whether the method accounts for changes resulting from relative sea level rise or likely damage from hurricanes in coastal restoration sites. The latter two stressors could adversely affect the long-term success of compensatory mitigation sites if proper precautions are not taken, so it would be useful to know if the model accounts for these potential problems.

Final Panel Comment 8:

Specific important metadata about the MCM model has not been included in either the Workbook or the Guidebook.

Basis for Comment:

Certain kinds of information about the Workbook and Guidebook are important to users and reviewers if they are to be effective in their roles. Absence of this information could affect the ability of the Workbook and Guidebook to serve their intended purposes.

a) The review package included no information describing the procedures for releasing updated versions of the Workbook and Guidebook.

Unless those procedures are documented and subjected to review, this review can provide no assurance that any future release of the Guidebook and Workbook will conform to any particular set of standards.

The Panel learned during the May 24th teleconference with USACE that the release frequency for the Workbook and Guidebook is expected to average about one release per month, and that one person will support this release stream. This ratio of staff to release rate emphasizes the importance of our comments regarding maintenance effort reduction. It also suggests the need for tools to automate the validating of the Guidebook, the Workbook, and any example workbooks that might someday be added to the release package.

b) Neither the Workbook nor the Guidebook has a revision number.

No cell or property of the Workbook holding a revision number could be located. Inspection did not reveal a revision number in the Guidebook. The Guidebook contains no indication of the corresponding revision number(s) of the Workbook.

Lack of a revision number complicates user support, documentation and the permitting process. Since Workbook updates are planned at about one per month, a revision number is strongly recommended.

To ensure that a permit decision is based on results from a known, reliable version of the Workbook, it is essential that the revision number of the Workbook be readily determined. It is equally important that users be unable to accidentally or intentionally modify the revision number of the Workbook.

Relying on a filename as a place to store a revision number or revision ID is inadvisable, because users are free to modify filenames at will.

A revision number prominently displayed in the Guidebook will be helpful in support dialogs, to confirm initially that the user has the latest appropriate documentation.

Starting with the second release, it is possible that someone might possess a Guidebook from one release, and a Workbook from another. This can create confusion, which increases the volume of questions from users and user requests for assistance. It can also lead to submission of Workbooks with user errors.

It might be argued that since confusion is impossible for the initial release, it is possible to delay addressing this issue until the Workbook and/or Guidebook diverge sufficiently from the initial releases. This is extremely risky, because the Guidebooks that lack identifying version information can remain

extant forever, even after new releases appear.

- c) **The Workbook does not contain a sheet holding general information, such as version number; email address(es), Web site and phone number(s) for support; where to download updates; email discussion list; Twitter ID; blog URL; and so on.**

Ideally, it should be very easy for users to determine what version of the Workbook they have, to find where to get support, and so on. A worksheet called “Info” or something equivalent provides that capability. Lack of an info sheet complicates the support process and increases user error rates and learning costs. The Info sheet can contain hyperlinks to email support, MCM home page, update page, blog, and just about anything else the user might need.

- d) **The review package did not include any developer/maintainer documentation.**

The review package includes a Workbook and a Guidebook, which is designed to assist users. However, there is no analogous documentation for developers, testers, maintainers or reviewers; there is no Reference Guide. People in these roles therefore face challenges in executing their responsibilities.

The consequences of the absence of a Reference Guide include elevated risk of delays and errors arising in the following situations:

- Attempting to address a problem or a need for enhancement, when the original author(s) are unavailable for any reason.
- Reliance by the author(s) on memory of the design and implementation when making subsequent revisions.
- During reviews, reviewers determine, or determine incorrectly, how the model works, or what the purpose of specific artifacts might be.

The significance of this deficit is very low in the short term (less than 30 days). But as time passes, the lack of a proper Reference Guide becomes increasingly costly in delays, errors, and rework. Beyond six months, the impact of this deficit can be very significant.

- e) **There is no information in the Guidebook telling the user where to turn for support, help, FAQs, answers to specific questions, how to report problems, or where to get updates.**

A thorough search revealed no such information. User support is essential. Insufficient user support can lead to public relations problems, increased support load, user distrust of results, and invalid submissions from users, from which it is difficult to recover.

Significance – High:

The Workbook must be considered untested. This means that its results cannot be verified by this Panel as correct. Release procedures must be viewed as part of the MCM system, because USACE intends to release updated versions of the items reviewed by this panel. If the Workbook and Guidebook are to serve their intended purpose effectively, they must be tested; their users need a more complete array of support materials; and the release procedures must be stable, tested and reviewed.

Recommendation(s) for Resolution:

To resolve these concerns, the Workbook and Guidebook would need to be modified as follows:

1. The revision number of the workbook should appear somewhere in the Print Area of each worksheet. This would enable permit authorities to determine the revision number even from hardcopy or softcopy representations of Workbook worksheets. In addition, the revision number should appear in the footer of any worksheet pages printed by the user. Entering that revision number into a locked cell, and propagating its display to the print areas of all user-visible worksheets

would make the model revision number visible on any images captured by users.

2. Release procedures should be documented and reviewed prior to each release of the Guidebook and Workbook into general use.
3. The revision number of the Guidebook should appear in the footer of every page of the Guidebook, except the cover page. It should also appear on the cover page, centered, just below the document title. The corresponding revision number(s) of the Workbook should appear wherever the Guidebook revision number appears.
4. A worksheet should be added as described above in (c).
5. A Reference Guide should be developed and included in future reviews.
6. The information specified above in (e) should be added as a first chapter of the Guidebook before the Guidebook and Workbook are released.

Final Panel Comment 9:

It is not clear whether the implicit assumptions related to assessing ecological factors in the MCM worksheets are valid.

Basis for Comment:

No rationale was provided for structuring the MCM worksheets as they were or for selecting the values that were assigned to the various model factors. In addition, there appears to have been a variety of implicit assumptions made in rating scores of categories within factors. Providing these assumptions and rationale in the Guidebook would provide the level of transparency needed for users and stakeholders to use or evaluate the models and to be aware of their limitations. The following assumptions and rationale particularly require explanations:

- a) Most of the factors used to model the ‘Adverse Impacts Worksheet’ worksheet and the ‘Restoration/Enhancement Worksh ’ worksheet are related to planning and programmatic objectives. Although the basic rankings of factors appear to be valid (except for the factor “Dominant Impact,” which appears to be ranked in a reverse order from the other factors, i.e., best condition= highest score, worst condition=lowest score), the reasons for including each factor were not provided. Also missing are the assumptions used to determine the ratings for the options within those factors.
- b) It appears that any impact to wetlands on a project site drives “Adverse Impact” factor scores (r) to zero; likewise, “Restoration-Enhancement” factor scores (m) at mitigation sites are assumed to be maximized at the conclusion of restoration activities. It is easy to predict whether r-scores at an impacted project will be reduced to a zero. However, one cannot be certain that a compensatory mitigation site will be successful, particularly for wetlands that take a long time to mature, during which time they might be altered by invasive species, subject to relative sea level rise, herbivory, and/or hurricanes. It is not clear how the restoration-related factors would accommodate unexpectedly low mitigation performance and whether the mitigation side of the ledger would be changed if full performance were not achieved. Perhaps the probability of mitigation success is already subsumed under some of the programmatic factors and lack of success triggers some policy-defined response, but the Guidebook does not address this issue. The MCM Guidebook should explain how mitigation performance is accounted for, whether by model factors or by policy not inherent to the MCM model. At the very least, the model should explicitly acknowledge all assumptions supporting it.
- c) There seems to be an underlying assumption that the qualitative ranking of function-related factors could be supported by defensible, quantitative data, if needed. This assumption is probably valid, but it should be stated. For non-routine, non-controversial projects, deriving scores from the qualitative rankings is probably sufficient if there is concurrence from stakeholders. However, for controversial projects, quantitative approaches such as the Hydrogeomorphic (HGM) approach, Habitat Evaluation Procedure (HEP), Index of Biological Integrity (IBI), or Ecological Value Assessment (EVA) method, could be used to substantiate the chosen categories that are relevant to wetland functions. By contrast, although the rankings of programmatic-related factors have no scientific basis, the rankings do provide a framework for meeting programmatic objectives. Therefore, assumptions supporting the rankings of programmatic factors should also be provided. This would provide support for the importance (weighting) given for the various factors used in determining compensatory mitigation options and would explain why USACE values certain types of mitigation options over others.
- d) No explanations were provided to support the underlying assumptions related to the weighting of

scores. For instance, the best possible score for marsh creation (m=4.0), (Guidebook p. 16, “Re-establishment 1” under ‘Mitigation Type’) is an order of magnitude higher than the best possible score provided for a site that will be managed by a non-profit conservation agency (0.4) (Guidebook p. 21, “Conservancy” under the factor ‘Control’). A few sentences could be used to explain that the type of mitigation is more important (more valued) than the nature of the entity that eventually manages the site. This explanation would explicitly outline USACE’s main priorities and help users and stakeholders better understand which factors are most important to USACE in influencing mitigation ratios.

Significance – Medium:

The clarity and transparency of the MCM model is compromised by not stating explicitly the various assumptions that underlie the choice of factors and the rationale for assigning the specific scores to those factors. This lack of transparency could adversely affect users’ confidence in and acceptance of the models.

Recommendation(s) for Resolution:

To resolve these concerns, the Guidebook would need to be modified to include the following:

1. The choice of factors in the model.
2. The reasons why project sites and restoration sites are assumed to score zero after impact, are assumed to be maximized after restoration, and how lack of success at mitigation sites would be handled if the sites fail to achieve performance goals.
3. The basis for the ranks provided for function-related factors and under what circumstance more quantitative and accepted methods would be used to support the subjective category choices, and
4. The reasons why scores for categories of factors are weighted as they are in the models.
5. The explanation for how mitigation performance is accounted for, whether by model factors or by policy not inherent to the MCM model. At the very least, the model should explicitly acknowledge all assumptions supporting it.

Final Panel Comment 10:

The architecture of parts of the Workbook makes it difficult to use and not transparent, perhaps impacting user confidence, overall usability, and maintainability.

Basis for Comment:

The user input tables, and one of the internal data tables, are implemented using an unclear and error-prone architecture.

The structures of the tables in ‘Adverse Impacts Worksheet’, ‘Restoration-Enhancement Worksh’, and ‘Mitigation Bank Data’, all of which interleave rows of user or developer input and computed numeric values, are laborious to construct, error-inducing to maintain, and confusing to use. User input and computed results should be segregated. The figure below is a pictorial example of an alternative architecture for ‘Restoration-Enhancement Worksh’.

Factors		Sites				
		Blossman	Elmwood	Drury	other site	Area 5
Net Improvement	Mitigation Type	Enhancement 1	Enhancement 1	Enhancement 1	Enhancement 1	(Select an Option)
	Maintenance/ Management Requirement	Active Vegetative Manipulation	Active Vegetative Manipulation	Active Vegetative Manipulation	Active Vegetative Manipulation	(Select an Option)
Negative Influences on the mitigation site	Commercial/Residential Development	No Impact	No Impact	Slight	No Impact	No Impact
	Oil & gas activities	No Impact	No Impact	No Impact	No Impact	No Impact
	Size	area >500 acres	area >500 acres	area >500 acres	area >500 acres	area >500 acres
	Utility Corridors	No Impact	No Impact	No Impact	No Impact	No Impact
	Transportation	No Impact	No Impact	Slight	Slight	No Impact
	Control	Transfer Fee Title Cons	(Select an Option)			
	Temporal Lag	0 to 5	0 to 5	10 to 20	0 to 5	(Select an Option)
	Credit Schedule	Schedule 3	Schedule 3	Schedule 3	Schedule 3	(Select an Option)
Kind	Category 1	Category 1	Category 1	Category 1	(Select an Option)	
Location Relative to Impact	Zone 2	Zone 2	Zone 2	Zone 2	(Select an Option)	
Net Improvement	Mitigation Type	2.4	2.4	2.4	2.4	0.0
	Maintenance/ Management Requirement	0.8	0.8	0.8	0.8	0.0
Negative Influences on the mitigation site	Total of Development, Oil & Gas, Size etc.	0.0	0.0	-0.2	-0.1	0.0
	Control	0.6	0.6	0.6	0.6	0.0
	Temporal Lag	0.0	0.0	-0.2	0.0	0.0
	Credit Schedule	0.2	0.2	0.2	0.2	0.0
	Kind	0.4	0.4	0.4	0.4	0.0
	Location Relative to Impact	0.3	0.3	0.3	0.3	0.0
Sum of m Factors		3.42	3.42	3.02	3.32	0.00
Size in Acres		52.00	36.00	24.50	66.00	0.00
$\sum (m \times A) =$		177.84	123.12	73.99	219.12	0.00
Acreage required for Site-Specific Mitigation project using required credits calculated in Adverse impact Worksheet		142.13	142.13	160.95	146.41	0.00
Total Restoration/Enhancement Credits = $\sum (A_i \times A_j) =$						374.95

Note: To make the text in the picture above more readable, increase the zoom of your window.

This approach has four groups of advantages over the current architecture.

Improved user confidence

The layout above makes more practical an enhanced display that shows the *m* values of all factors in the group called “Negative Influences on the mitigation site.” The current configuration suppresses display of these values.

Improved usability

The user (and developer) can more readily select options, which are all placed together in the upper table. Finding the *m* values determined by those options is no more difficult in this approach than it is in the current approach. Locating the precise cell in which to enter or adjust an option is much easier. The use of shading guides the eye.

Lower cost maintenance and development

Because like cells are gathered together, the computation of m values is greatly simplified. For instance, all of the cells in the m value portion of the table share a common formula. That formula is simply filled across the entire range. This greatly reduces development, maintenance, and review costs. Most importantly, it reduces errors in development and maintenance.

Better support for tools and automation

If tools are someday developed, this architecture simplifies them. For instance, a tool might be developed to certify that a particular Workbook submitted by an applicant does use the correct and up-to-date mitigation bank data, and that the data has not been tampered with.

Significance – Medium:

The current architecture is extremely difficult to use, maintain, and review.

Recommendation for Resolution:

To resolve these concerns, the Workbook would need to be modified as follows:

1. Adopt a spreadsheet architecture like the one described above, which groups like cells with like.

Final Panel Comment 11:
The references to figures, worksheets, and terminology in the Guidebook are not in correspondence with the Workbook.
Basis for Comment:
The Guidebook has numerous typographical and grammatical errors. However, there are also problems with terminology. Specifically, many references to figures, worksheets, and terminology in the Guidebook do not match those in the Workbook, making it difficult to determine whether the Workbook or the Guidebook is correct. This may not be a problem for the W-14 Canal project, since the data have already been analyzed. However, the Guidebook and Workbook will apparently be used extensively by USACE personnel and civilian users who may be unfamiliar with the models and, therefore, may need to extensively consult the Guidebook.
Significance – Medium:
The problems with typographical errors and, in particular, inconsistent terminology affect the potential usability of the models by the public. This may prevent widespread use of the models, or lead to widespread user confusion and expenditure of USACE resources to provide clarification.
Recommendation for Resolution:
To resolve these concerns, the Workbook and Guidebook would need to be modified as follows: 1. Correct the typographical errors, grammatical errors, and errors in mismatched terminology. The specific problems are too numerous to list here, so they are provided in Appendix C.

Final Panel Comment 12:

The MCM model Workbook contains implicit assumptions that compensatory mitigation projects will be successful over the long term, and fails to account for risk that might undermine long-term success.

Basis for Comment:

The MCM model Workbook evaluates the expected life of compensatory mitigation projects and uses a number of factors to determine the wetland functions that will be provided by wetland restoration. However, the MCM does not assess the probability of long-term success of mitigation efforts. The functions and values of the site are calculated by selecting options for factors that fit site conditions at the time in which compensatory mitigation sites are selected.

The Gulf of Mexico coastal region is prone to sea level rise and inundation from tropical storms, which could greatly compromise the long-term success and outcome of the compensatory mitigation efforts. Other mitigation banks in the New Orleans District were heavily impacted by Hurricane Katrina storm surge and have not yet recovered many of the pre-disturbance conditions, suggesting that coastal wetland mitigation banks are vulnerable to relative sea level rise and so may be at great risk over the long term. Failure of these sites to provide important wetland functions in the landscape may greatly undermine the no-net-loss of wetlands programmatic objectives.

Invasive species are another pervasive threat to restoration success. Even relatively pristine wetlands are prone to invasion by highly aggressive exotic species: e.g., Chinese tallow, Chinese privet, and cogongrass. Sites that have been disturbed by hurricanes are at particular risk of invasion by exotic species. Restoration sites that become invaded can quickly become degraded, leading to diminished functional capacity.

Even for non-coastal areas, the MCM model does not adequately assess the probability of long-term success of mitigation efforts. For example, the time frame provided in the model for bottomland hardwood recovery is 20 years. This figure seems arbitrary and too low for the recovery of functions provided by mature bottomland hardwood stands.

Significance – Medium:

Given that the model does not incorporate the likelihood of long-term success in restoring wetland functions for this vulnerable coastal region, their capacity is greatly diminished for use in achieving programmatic requirements of no-net-loss of wetlands.

Recommendations for Resolution:

To resolve these concerns, the MCM model would need to be modified to include the following:

1. A factor incorporating the probability of success that includes vulnerability of the coastal landscape to relative sea level rise, hurricane return interval, and invasive species.
2. A revision of the 'Temporal lag' factor to provide a more ecologically-realistic time frame for the recovery of bottomland hardwood ecosystems.

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APPENDIX B

Final Charge to the Model Review Panel

on the

Modified Charleston Method Model Review

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**Final Charge Guidance and Questions to the Model Reviewers
for the Model Review of the Modified Charleston Method for the
Southeast Louisiana Urban Flood Control Project, W-14 Canal,
St. Tammany Parish, Louisiana**

BACKGROUND

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared an Environmental Assessment (EA #409) to evaluate the potential impacts associated with the proposed design modifications and maintenance of flood damage reduction features described in the St. Tammany Parish, Louisiana Reconnaissance Study dated July 1996. EA #409 has been prepared in accordance with the National Environmental Policy Act of 1969 and the Council on Environmental Quality's Regulations (40 CFR §1500-1508), as reflected in the USACE Engineering Regulation, ER 200-2-2. The proposed action (W-14 Canal project) is located near New Orleans, Louisiana, in the City of Slidell, along the W-14 Canal drainage basin. The project includes improving approximately 4.1 miles of the W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, excavating two new detention ponds with overflow weirs, expanding an existing pond, installing culverts, replacing three existing bridges, and constructing a new pump station. Restoration measures would be implemented to reduce visual impacts by replanting trees and other vegetation to as near pre-project conditions as practicable.

The purpose of the W-14 Canal project is to reduce the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin. The western portion of the Slidell area floods primarily from heavy rainfall and the inability of the existing drainage network to handle the resulting flows. The eastern portion of the Slidell area floods primarily from high water stages in the nearby Pearl River. Major flooding has occurred in the Slidell area due to heavy rainfall events, tropical storms, hurricanes (including Hurricanes Katrina and Rita), and high water stages on the Pearl River.

The model to be evaluated for this review is the Modified Charleston Method (MCM). The primary application of the MCM is to assist regulators with efficiently and consistently quantifying adverse impacts associated with permit applications and compare the result with existing mitigation banks. Alternatively, the MCM can be used to determine the amount of credit generated by a proposed mitigation project, either permittee-responsible or mitigation banking. The model review should focus on the single application of this model to the W-14 Canal project, as it is not anticipated to be used on other projects and will not be added to the USACE planning model toolbox.

OBJECTIVE

The objective of this effort is to conduct a review of the application of the Modified Charleston Method to the W-14 Canal project in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers, Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010; and the Office of Management

and Budget's *Final Information Quality Bulletin for Peer Review* released December 16, 2004. Because the successful application of the MCM is dependent upon the technical quality of the model, other guidance documents that will be provided for reference include Department of the Army, U.S. Army Corps of Engineers *Planning Models Improvement Program: Model Certification* (EC 1105-2-407), dated May 31, 2005 and USACE Planning Models Improvement Programs document entitled *Protocols for the Certification of Planning Models*, dated July 2007.

The MCM is a variation of the Charleston Method, a mitigation assessment technique developed by USACE Charleston District. The CEMVN, in collaboration with the Interagency Review Team (IRT), has modified this assessment technique to account for: 1) "Mitigation Standard Operating Procedures" of CEMVN, 2) the compensatory mitigation regulations found at 33 CFR Part 332, and 3) regional wetland differences. The model review will analyze the adequacy and acceptability of this approach for quantifying potential impacts to fish and wildlife resources in the pine-savanna habitat type and for evaluating mitigation alternatives. The model review shall be limited to technical review and will not involve USACE or other Federal policy review.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials that will be provided for the review. **The documents and files presented in bold font are those which are to be reviewed.** All other documents are provided for reference.

- **Modified Charleston Method W-14 Canal Project-Specific Workbook 2009. U.S. Army Corps of Engineers, New Orleans District. (W-14 Canal MCM Workbook 2-09.xls)**
- **Modified Charleston Method Guidebook for the Use of the Excel Workbook. U.S. Army Corps of Engineers, New Orleans District. 30 pp. (MCM Guidebook 10-28-09.pdf)**
- Modified Charleston Method Blank Workbook 2009. U.S. Army Corps of Engineers, New Orleans District. (MCM 2009-11-1.xls)
- SELA Urban Flood Control Project Environmental Assessment (EA) for the W-14 Drainage Canal, Slidell Area, St. Tammany Parish, LA and:
 - EA 409 Appendix
 - EA 409 Finding of No Significant Impact (FONSI)
- SELA Urban Flood Control Project 533(d) report for the W-14 Canal Improvements, St. Tammany Parish, LA and:
 - Slidell LA W14 Canal Project - 533(d) Engineering Appendix
 - Slidell LA W14 Canal Project - 533(d) Economic Appendix
 - W-14 Real Estate Plan (REP)
 - Addendum A Slidell W-14 Project – Geology Data
 - Addendum B Slidell W-14 Project – Canal Improvements Design
 - Addendum C Slidell W-14 Project – Bridges Design
 - Addendum D Slidell W-14 Project – Pump Station Design
 - Addendum E Slidell W-14 Project – Relocations Maps
 - Addendum F Slidell W-14 Project – CSRA Report
 - Addendum G Slidell W-14 Project – Project Plates
 - W-14 Canal, Slidell, LA Recommended Plan Detail

- USACE’s Civil Works Review Policy (EC 1165-2-209) (31 January 2010)
- Office of Management and Budget’s Final Information Quality Bulletin for Peer Review (16 December 2004)
- Department of the Army, U.S. Army Corps of Engineers *Planning Models Improvement Program: Model Certification* (EC 1105-2-407) (31 May 2005)
- USACE Planning Models Improvement Programs document entitled *Protocols for the Certification of Planning Models* (July 2007)

SCHEDULE

TASK	ACTION	DUE DATE
Conduct Peer Review	Review documents sent to panel	5/18/2010
	Battelle/panel Kick-off Meeting	5/24/2010
	USACE/Battelle/panel Kick-off Meeting with peer reviewers	5/24/2010
	Model review panel completes their review	6/8/2010
Prepare Final Panel Comments and Final Model Report	Battelle collates comments from panel	6/9/2010
	Battelle convenes model review teleconference	6/11/2010
	Battelle provides Final Panel Comment (FPC) directive to model review panel	6/14/2010
	Panel provides draft Final Panel Comments (FPCs) to Battelle	6/21/2010
	Battelle provides feedback to panel on FPCs and panel finalizes the FPCs	6/24/2010
	Battelle provides Final Model Review Report to panel for review	6/29/2010
	Panel provides comments on Final Model Review Report	6/30/2010
	Battelle submits Final Model Review Report to USACE	7/6/2010
Teleconference	Battelle convenes teleconference to discuss USACE clarifying questions on Final Model Review Report	7/15/2010

CHARGE FOR MODEL REVIEW

Members of this model review panel are asked to determine whether the MCM is a suitable model for the selection of alternatives for the W-14 Canal project and whether the technical approach of the MCM is credible, scientifically supported, and produces reliable results that can effectively be used to support conclusions of an alternatives analysis for the W-14 Canal project. The Panel is being asked to provide feedback specifically on the application of the MCM for quantifying potential impacts to fish and wildlife resources in the pine-savanna habitat in the project area and for evaluating mitigation alternatives.

Specific questions for the panel members are included in the general charge guidance, which is provided below.

General Charge Guidance

The intent of the following guidance and questions is to focus your review on the criteria that need to be evaluated.

1. Please answer the scientific and technical questions listed below and conduct a broad overview assessment of the model **focusing on your areas of expertise and technical knowledge. You are not obligated to answer every question, only those applicable to your expertise.** Use the Charge Question Response Table provided when answering the questions.
2. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
3. Evaluate the soundness of the model as applicable and relevant to your area of expertise. Comment on whether the model effectively represents the system being modeled and how model will be validated.
4. Please focus the review on scientific information, including factual inputs, data, the use and soundness of model calculations, assumptions, and results that inform decision makers.
5. Offer opinions as to whether the model parameters and formulas are sufficient to quantify ecosystem function.
6. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of the models, surveys, investigations, and methods.
7. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable for decision-making.

Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Agency Technical Review.
2. Please contact the Battelle deputy project manager (Corey Wisneski, WisneskiC@battelle.org) or project manager (Karen Johnson-Young, johnson-youngk@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle project manager immediately.
4. Your name will appear as one of the panelists in the model review. Your comments will be included in the Final Model Review Report, but will remain anonymous.

Please submit your comments in electronic form to Corey Wisneski, WisneskiC@battelle.org no later than June 3, 2010, 10 pm EDT.

SPECIFIC CHARGE QUESTIONS

General Questions

1. Does the model described meet the needs/objectives for the W-14 Canal project? If not, explain why.

Technical Quality

2. Comment on the overall technical quality of the Modified Charleston Method (MCM).
3. Comment on the temporal and spatial resolution of the MCM.
4. Are geographic boundaries for the MCM clearly defined? If not, should the application of the MCM be limited geographically?
5. Are the limitations of the MCM clearly defined?
 - a. How do the limitations impact the ability of the model to evaluate mitigation alternatives for the W-14 Canal project?
 - b. What are the potential impacts to the project?
 - c. How can those limitations be overcome?
6. Is the MCM based on well-established contemporary theory?
7. Is the model a realistic representation of the actual ecosystem being modeled?
8. Does the model effectively capture the variables that are most important for the intended use of the model?
9. Comment on the precision and accuracy of the model for evaluating potential outcomes of project alternatives. What factors/variables provide the greatest impact on precision and accuracy?
10. Are model outputs sufficiently sensitive to measure change at the level of resolution needed?
11. Are the analytical requirements of the model properly identified? Do the data collected for the W-14 Canal project meet those requirements? If not, why?
12. Are the MCM assumptions clearly identified, valid, and do they support the objectives of the MCM?
13. Comment on the ability of the model to evaluate risk and uncertainty in the selection of project alternatives.

14. Comment on the ability of the model to evaluate impacts and benefits of the W-14 Canal project alternatives for total project life.
15. Are the formulas used in the models correct and are the model computations appropriate and done correctly?
16. Do the models allow the user(s) to make assumptions regarding future global events such as, but not limited to, global climate change and changes to sea level?

System Quality

17. Has the model been sufficiently tested and validated, and have all critical errors been corrected?

Usability

18. Comment on the usability of the MCM spreadsheet model.
19. Comment on the availability of the data required by the model.
20. How easily are model results understood?
21. Is the spreadsheet model transparent enough to understand and verify how the model outputs were obtained?

APPENDIX C

Typographic and Grammatical Errors

in the

Modified Charleston Method Model Workbook and Guidebook

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MCM Guidebook:

p. 1, line 23. Last word of paragraph should be plural.

p. 2, line 5. The meaning of the “a sliding scale” needs elaboration.

p. 2, line 22. MCM is primarily a value-based assessment, i.e., most of the assessment factors (variables) relate to policy and programmatic needs, such as whether an impact site is a “Priority Wetland,” whether a mitigation wetland is in the appropriate “Service Area,” or what entity will eventually control or manage a restoration site.

p. 2, line 30. Insert a comma behind data and insert “being” behind “result.”

p. 3, line 13. Change “practicable” to “practical.” Practicable means doable, while practical means the most appropriate. There are also other places in the guidebook where this word occurs. (The word may occur in regulations and so this may be why it was used this way in the guidebook.)

p. 4, line 4. Impacts can be positive as well, e.g., the impact of restoration.

p. 5, line 26. Define what constitutes a “long” development time.

p. 7, lines 8-9. Some of the factors (n=5) relate to functioning, but most (n=14) relate to programmatic needs. The factors related to programmatic needs (value assessment) help the USACE plan compensatory mitigation in the District, but offer little information concerning the condition of wetlands. This distinction should be elaborated upon.

p. 9, line 41. The “Existing Vegetative Condition” factor could be more aptly named “Existing Habitat Condition,” because more than just vegetation condition is being characterized. (Biogeochemical functions are embedded in this factor as well.) The “Classes” could be more aptly called “Condition,” e.g., Condition 1, Condition 2, etc. For each narrative for a Class/Condition, place the most general statement first, then the more detailed descriptions. For example, for Class/Condition 3 (lines 10-16), could say something like....

Condition 3: Provides moderate quality habitat. This condition pertains to forest ecosystems that are missing typical canopy components due to recent clearcutting, are intensively managed as pine plantation, or are being overgrazed. Recent clearcut forest often dominated by species typically found in the midstory, such as boxelder or ironwood. Managed pine plantation are typically bedded and are managed for loblolly or slash pine. Overgrazed forests usually have a sparse or absent groundcover and midstory strata. For marshes, open water and non-vegetated area cover >50%, marsh is partially impounded, or pipelines and roads fragment marsh into areas <X acres in size. (The more specificity, the better.)

p. 10, line 2. Change “logged” to “harvested” or “clearcut.”

p. 10, lines 4-5. It is not clear how a fire-adapted ecosystem can provide “good quality habitat” without fire. Without fire, habitat quality will be poor for fire-adapted organisms. It seems that the basis for habitat quality should be determined by the type of habitat that would have been present historically, especially if that habitat is slated for restoration.

p. 10, lines 20, 21. “Substantially fragmented and substantially impacted” should be defined or Best Professional Judgment will be invoked.

- p. 10, line 31. Insert “normal” before “physical.”
- p. 10, line 32. Change “existing” to “the normal (unaltered).”
- p. 10, line 38. Delete “caused” and “functional.”
- p. 10, line 39. Insert “of hydrologic function” after “recovery.”
- p. 10, line 43. Delete “area.”
- p. 16, line 14. It appears that the lowest possible score (m) for “Net Improvement” is not 0.3, but rather 0.2 (for “Buffers”).
- p. 17, line 13. Change “Sponsor to replace” with “Sponsor has replaced.”
- p. 17, line 23. Change “non-target type” with “unnatural.”
- p. 17, line 25. Define “preferable vegetative suite.”
- p. 17, line 31. Add “have been” to the end of the line.
- p. 17, lines 35-38. The meaning of the category “Hydric Inclusions (m=0.6)” is unclear. It seems that “preservation” might fall in this category. If so, then preservation would provide a functional lift in MCM. If true, then this warrants recognition.
- p. 18, line 5. Define “conservation servitude.”
- p. 18, line 25. Define “timber stand improvement.”
- p. 18, line 33 to p. 21, line 15. Scores (m) for “Negative influences” do not have values (scores) associated with them here or in the spreadsheet.
- p. 18, lines 33-34. Define “internal and external” anthropogenic influences.
- p. 18, line 38. Change “affectively” to “effectively.”
- p. 19, line 1. Change “determining the level of weight a” to “weighting” and “influence may have” to “influences.”
- p. 19, line 2. Change “on the mitigation projects” to “on mitigations projects.”
- p. 19, lines 2-5. The first full sentence beginning with “In addition,” is confusing. Perhaps delete the main sentence and just use what follows “e.g.”
- p. 19, lines 7-13. Determining the “sides” of a mitigation project may be difficult if it is oddly shaped. Percent area of a 1-mile radius circle could be easily computed, but “sides” could sometimes be difficult to determine. Explain how to identify a “side.”
- p. 19, line 29. Change “well sites” to “oil or gas extraction wells.”

p. 19, line 35. Perhaps change “remediated” to “decommissioned” if that makes sense.

p. 19, line 39. Change “well sites” to “oil or gas extraction wells.”

p. 19, line 45. Define “diversity.” Does diversity refer to habitat diversity or species diversity? It seems that habitat heterogeneity is what was meant in the rest of the paragraph.

p. 20, line 2. Change “diversity are quite available” to “habitat heterogeneity is pronounced.”

p. 20, line 5. Add “for maintaining populations” behind “forest tracts.”

p. 20, line 5-7. Suggest changing as follows: Therefore, the basic assumptions for this sub-factor is are that larger tracts are less common in the New Orleans area, the potential for habitat diversity is greater, and larger tracts provide a degree of isolation and thereby offer higher quality habitat than smaller tracts.

p. 20, lines 9-13. If there is any ecological basis for the threshold for acreage categories, then justification should be provided.

p. 20, line 19. The term “subordinated to the Control” is confusing. Elaborate.

p. 20, lines 38. Change “as they” to “if they” and put parentheses around “with minor or no ditching.”

p. 20, line 40. Add a comma behind “area.”

p. 20, line 43. Please clarify what is meant by “the maintenance schedule.”

p. 21, lines 1-3. The following changes are suggested to clarify:

Original: No Impact: Absent or if present, private through or lightly traveled public road bordering property with shallow to no ditches with little impact on hydrology. Does not affect management efforts to restore the site.

Suggested: No Impact: Roads absent in tract, or if present, are private or lightly traveled public roads bordering property that have shallow or no ditches associated with them, and have with little impact on hydrology. Roads will not hinder restoration efforts.

p. 21, lines 9-12. The following changes are suggested to clarify:

Original: Moderate: Private road through property which impedes surface runoff over a large portion of the property. Heavily traveled road bordering property with major ditches that remove or redirects surface water to the extent that makes hydrologic restoration of all or portions of the property difficult.

Suggested: Moderate: Tract has a private road through the property that impedes surface and subsurface flow of water over a large portion of the property or the tract has a heavily traveled road bordering the property with major ditches that remove or redirect surface waters to a degree that makes hydrologic restoration of all or portions of the property difficult.

p. 21, line 15. Insert “prescribed” before burning.

p. 22, Table line 1-11. Twenty years seems like too short a time for restoration of functions in the forested types. It takes at least 50 years for habitat features to develop, particularly litter, large down wood, snags, and a full development of the understory strata.

p. 22, line 28. The term “Kind” is not very descriptive of the category type. Perhaps a better term might be “Wetland similarity” to refer to “Similarity of restored wetland community type.”

p. 23, lines 2. To clarify, put quotation marks around “mitigation from bank.” Otherwise, the wording is confusing.

p. 23, lines 3. Change “enhancement sheet to “enhancement worksheet.”

p. 23, lines 7-8. Is a cataloguing unit based on political boundaries or watersheds? This should be clarified. Also, define “primary service area.”

p. 23, lines 10-11. Define the difference between a primary and secondary service area.

p. 23, line 15. Change “stresses” to “prioritizes.” Also, change “practicable” to “practical.”

p. 24, line 8. Change “compensate” to “provide compensatory mitigation.”

p. 25, line 28-29. Change “to the beginning of the” to “with” and change “the option” to “the chosen option.”

p. 25, line 32. The factor “Location Relative to Impact” does not match p. 23, line 1, which is named simply “Location.”

p. 27, line 2. After “credits,” add “when the condition of those wetlands are considered.”

p. 27, lines 21-31. The following changes are suggested to clarify the explanations.

Original: Information required on this worksheet is entered through pull-downs. By Selecting a bank you populate the hydrologic unit and the mitigation bank watershed. The impacted site watershed information is carried over from the Adverse Impact worksheet. Also, when a bank is selected the credit value the bank is entered into the “Sum of m Factors”. The only other information required is to determine the options for “kind” and “location” factors.

Continuing the example of Company XYZ: Instead of performing a permittee-responsible mitigation project, the applicant has proposed to mitigate at an appropriate bank. From a list of appropriate banks provided by the Corps’ project manager, the applicant selected the Jambalaya Mitigation Bank to provide the required mitigation credits. The Bank is located approximately 15 miles from the impacted site but within the same watershed and has BLH credits available.

Suggested: Information required on this worksheet is entered through pull-down menus. Selecting a bank populates data for the hydrologic unit and the mitigation bank watershed spreadsheets. Information on the impacted site’ watershed is transferred to the “Adverse Impact” worksheet. Also, when a particular mitigation bank is selected the credit value of shares remaining in the bank is entered into the “Sum of m Factors” cell. The only other information required is to determine the options for “kind” and “location” factors.

Alternatively, rather than performing a permittee-responsible mitigation project, the applicant proposes to purchase compensatory mitigation credit from an appropriate bank. From a list of appropriate banks provided by the Corps’ project manager, the applicant selected the Jambalaya

Mitigation Bank to provide the required mitigation credits. The Bank is located approximately 15 miles from the impacted site but within the same watershed and has BLH credits available.

p. 27, line 34. Change “is worth. Completing” to “possesses. In completing.”

Guidebook Figures:

The Guidebook provides an example scenario to determine credits required to compensate for project impacts to a hypothetical project site and an example to determine the credits available at a hypothetical compensatory mitigation site. Providing these examples should be helpful to users. However, the example worksheets provided in Figures 1-6 conflict with worksheets in the Workbook in a number of ways: (1) the cells indicating the permit numbers differ between Figure 1 and 2 relative to the cells in the ‘Adverse Impacts Worksheet’, (2) cells summarizing the credits/acre and size in acres at the bottom of Fig 4 are not in the Worksheet ‘Restoration-Enhancement Worksh ’, (3) the cells in Figure 5 are not populated by inputs suggested by the example provided on p. 24 of the Guidebook, and (4) the placement of the cells summarizing the credits/acre and size in acres that are in Figure 5 differ from Figure 4. In addition, it is not clear whether the Worksheets provide the results shown in Figures 2 and 3 (no results were provided in Figures 5 and 6).

More specifically, Figures 1 and 2 have a problem with alignment and location of some captions. Headings and explanatory text are needed. In Figure 4, row 15 seems to be missing; the rows immediately below the table don’t correspond to the Workbook. The Guidebook figure has a text box at the top, but the Workbook does not. For Figure 5, columns I, J, K, etc. and rows 37-38 contain elements not present in the actual Workbook. The Workbook displays *m* values for Mitigation Type, while Figure 5 does not.

Other differences between the Guidebook and Workbook include the Headings span (Guidebook: rows 1-9; Workbook: rows 2-11) and the Tables span (Guidebook: rows 11-35; Workbook: rows 12-38).

Problems with cells, cell references, and terminology in the Workbook.

<i>Cell Reference</i>	<i>Contents</i>	<i>Comment</i>
'Mitigation Bank Data'!A155:A156	Rockefeller Refuge Bank	Rockefeller is misspelled
'Restoration-Enhancement Worksh '!D62:E62	Re-establishment	The hyphen is not present in the preferred spelling. See http://en.wiktionary.org/wiki/reestablishment
'Mitigation Bank Data'!E3:E5 'Mitigation Bank Data'!E7:E9 'Mitigation Bank Data'!E11:E12 'Mitigation Bank Data'!E14	Holocene Aluvium	"Aluvium" should be "Alluvium"

<i>Cell Reference</i>	<i>Contents</i>	<i>Comment</i>
'Mitigation Bank Data'!E16:E17		
'Mitigation Bank Data'!E19:E22		
'Mitigation Bank Data'!E24		
'Mitigation Bank Data'!E26		
'Mitigation Bank Data'!E28:E34		

In the table below, which enumerates some examples of typographical and grammatical issues, CMS means *The Chicago Manual of Style*.

<i>Page:Line(s)</i>	<i>As written</i>	<i>Should be</i>
1:15	within each factor The calculations	within each factor. The calculations
1:23	consistent results among users with diverse background.	consistent results among users with diverse backgrounds.
1:25	assist regulators to efficiently and consistently quantify adverse	Either: help regulators to efficiently and consistently quantify adverse Or: assist regulators in efficiently and consistently quantifying adverse
1:40-41	handles the location of the mitigation project to the adverse impact.	handles the location of the mitigation project relative to the location of the adverse impact.
2:36	impacts were either to exceedingly poor	impacts were either exceedingly poor
3:45	sub-divided	subdivided
4:36	Re-establishment	Reestablishment
6:7	sandflats	sand flats
16:9	each options	each option

24:10	Isolated from surrounded	Isolated from surrounding
24:16	...to the "Land Trust", a conservation...	...to the "Land Trust," a conservation... (See CMS 6.8)
27:19, 27:29	Other examples of periods or commas that should be inside quotes	
24:8-20	Inconsistent pronoun use with reference to applicant, which is XYZ company: "they," "he," "his,"	For a company, "it" is recommended. Alternatively, use "the applicant."
8:3, 12:39, 12:40, 13:22, 14:1, 23:22, 25:5, 25:10	type in, type, typed	"Enter" in its various forms is preferred for readability.
14:2, 16:2, 16:4, 16:7, 16:10, 16:12, 27:30	"area 1", "area 2", etc.	"Area 1", "Area 2", etc.
4:1, 4:44, 18:17, 27:18	"/" between words	No spaces adjacent to the slash
5:31	Spurious newline	This causes spell check to flag as erroneous the word "projects" on line 32
11:8	Spurious tab	After "r"
14:1	Spurious period after "project"	Delete. This causes the grammar checker to flag an error.
26:5	Spurious period	Delete. This causes the grammar checker to flag an error.

<i>Page 25 line</i>	<i>Comment</i>
16	"re-establishment" is not an option. Possible options include "Re-establishment I" and "Re-establishment II"; but see "Spelling errors" above.
17	The <i>m</i> value is incorrect for both of the Reestablishment options
19	"self-sustaining" is not an option. Possible option: "Self-Sustaining." See "Use of case in option names is inconsistent," below).
20	The <i>m</i> value is incorrect
25	"transfer fee title" is not an option. Possible option: "Transfer Fee Title Conservancy"

29	"schedule 2" is not an option. Possible option: "Schedule 2".
31	"in-kind" is not an option. Possible option: "Category 1"
32	Option name not supplied. Possible option: "Zone 1".

Use of case in option names is inconsistent: Option names for model parameters are sometimes in Title Case (initial letter of all words except conjunctions and non-initial articles capitalized), and sometimes in Sentence case (initial word initial capital).

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Oil & gas activities’ option types provided in the validation list differ from the names given in the Guidebook, but not from the text of the comment in cell C19. This misalignment can cause user confusion, because the Guidebook describes items not supported by the Workbook.

The table below shows the misalignment **highlighted in this color**.

<i>Workbook</i>	<i>Guidebook Page 19</i>	<i>Comment in Cell C19</i>
No Impact	No Impact	No Impact
Serious	Slight	Serious
	Slight to Moderate	
	Moderate	
	Serious	

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Size option’ types provided in the validation list differ from the names given in the Guidebook, and from the text of the comment in cell C20. This misalignment can cause user confusion, because the names differ (though slightly).

In addition, the option names should include \geq symbols as appropriate, and consistently. Currently, for example, none of the options covers a site whose area is, say, exactly 100 acres. There are options for less than 100 acres, and options for more than 100 acres, but none for exactly 100 acres. This could confuse some users.

The table below shows the misalignment **highlighted in this color**. Note that some misalignments are misalignments in the use of case. Note that some misalignments are due to the use of the semicolon.

<i>Workbook</i>	<i>Guidebook Page 20</i>	<i>Comment in Cell C20</i>
area >500 acres	Site \geq 500 acres;	Area > 500 acres;
area <500 >250 acres	Site < 500 > 250 acres	Area < 500 > 250 acres
Area <250 >100 acres	Site < 250 > 100 acres	Area < 250 > 100 acres
Area <100 >50 acres	Site < 100 >50	Area < 100 >50
Area <50 acres	Site < 50	Area < 50

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Utility Corridors’ option types provided in the validation list differ from the names given in the Guidebook, but not from the text of the comment in cell C21. This misalignment can cause user confusion, because some of the options supplied in the Guidebook are not supported by the Workbook.

The table below shows the misalignment **highlighted in this color**.

<i>Workbook</i>	<i>Guidebook Page 20</i>	<i>Comment in Cell C21</i>
No Impact	No Impact	No Impact
Serious	Slight	Serious
	Slight to Moderate	
	Moderate	
	Serious	

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Transportation’ option types provided in the validation list differ from the names given in the Guidebook, but not from the text of the comment in cell C22. This misalignment can cause user confusion, because one option described in the Guidebook is not supported in the Workbook.

The table below shows the misalignment **highlighted in this color**.

<i>Workbook</i>	<i>Guidebook Page 21</i>	<i>Comment in Cell C22</i>
No Impact	No Impact	No Impact
Slight	Slight	Slight
Serious	Moderate	Serious
	Serious	

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Control’ options provided in the validation list differ from the names given in the Guidebook, and from the text of the comment in cell C24. Moreover, the order of the options in the Workbook drop-down list is reversed relative to the order given in the Guidebook and in the comment in cell C24. This misalignment can cause user confusion, because the names differ (though slightly).

The table below shows the misalignment **highlighted in this color**. **Boldface items** also have discrepancies for *m* values. These values should be deleted from the Guidebook, or presented with all options in summary tabular form on a single page, to lower Guidebook maintenance costs.

<i>Workbook</i>	<i>Guidebook Page 21</i>	<i>Comment in Cell C24</i>
No Control	No Controls	No Controls
Subdivision Covenant	Subdivision Covenant	Subdivision Covenant
Deed Restriction	Deed Restrictions	Deed Restrictions

<i>Workbook</i>	<i>Guidebook Page 21</i>	<i>Comment in Cell C24</i>
Conservation Easement	Conservation Servitude	Servitude
Transfer Fee Title Conservancy		

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Temporal Lag’ options provided in the validation list differ from the names given in the Guidebook, and from the text of the comment in cell C26. Moreover, the order of the options in the Workbook drop-down list is reversed relative to the order given in the Guidebook and in the comment in cell C26. Note that some of the discrepancy is a discrepancy in capitalization, and that capitalization is inconsistent even with the Guidebook option names and the Comment option names. This misalignment can cause user confusion, because the names differ (though slightly).

The table below shows the misalignment **highlighted in this color**.

<i>Workbook</i>	<i>Guidebook Page 22</i>	<i>Comment in Cell C26</i>
Over 20	Over 20 Years	Over 20 Years
10 to 20	10 to 20 Years	10 to 20 Years
5 to 10	5 to 10 years	5 to 10 years
0 to 5	0 to 5 years	0 to 5 years

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Credit Schedule’ options provided in the validation list are presented in an order reversed relative to the order given in the Guidebook page 22 and in the comment in cell C28.

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Kind’ options provided in the validation list are presented in an order reversed relative to the order given in the Guidebook page 22 and in the comment in cell C30. In addition, there is a discrepancy in the *m* value shown for Category 5. Since displaying the *m* value in the Guidebook provides little user value, these values should be deleted from the Guidebook to lower Guidebook maintenance costs.

With regard to order, precisely analogous comments apply to the ‘Kind’ options of the worksheet ‘Mitigation From Bank Worksheet’. However, there is deviation in *m* values with respect to the Guidebook. These values should be deleted from the Guidebook, or presented with all options in summary tabular form on a single page, to lower Guidebook maintenance costs.

On the sheet named ‘Restoration-Enhancement Worksh’, the names of the ‘Location’ options provided in the validation list are presented in an order reversed relative to the order given in the Guidebook page 23 and in the comment in cell C32. In addition, there is a discrepancy in the *m* value shown for Zone 4. Since displaying the *m* value in the Guidebook provides little user value, these values should be deleted from the Guidebook to lower Guidebook maintenance costs.

With regard to order, precisely analogous comments apply to the ‘Location’ options of the worksheet ‘Mitigation From Bank Worksheet’. However, there is deviation in *m* values with respect to the Guidebook. These values should be deleted from the Guidebook, or presented with all options in summary tabular form on a single page, to lower Guidebook maintenance costs.

Page 7 of the Guidebook contains the following statement:

MCM is formatted as a Microsoft Excel workbook composed of four worksheets: “Summary,” “Adverse Impact”, “Mitigation from Bank”, and “Restoration and Enhancement”.

The worksheet names supplied in the Guidebook are not in alignment with the worksheet names as implemented. It is recommended that the names be brought into alignment. The table below shows the discrepancies.

<i>As-Implemented Name</i>	<i>As-Documented Name</i>
Summary Worksheet	Summary
Adverse Impacts Worksheet	Adverse Impact
Mitigation From Bank Worksheet	Mitigation from Bank
Restoration-Enhancement Worksh<space>*	Restoration and Enhancement

* The fourth user-visible worksheet name has a trailing space

References to the various worksheets and ranges on those worksheets are inconsistent throughout the Guidebook.

Reference to ‘Summary Worksheet’

<i>Referred to as</i>	<i>On Page(s)</i>
Summary Table	14, 15, 25, 27, 28
Summary Worksheet	26, 28

Reference to ‘Adverse Impacts Worksheet’

<i>Referred to as</i>	<i>On Page(s)</i>
Adverse Impacts Table	8, 11
Adverse Impacts Worksheet	13
Adverse Impact Table	14
Adverse impact worksheet	15
Adverse Impact	27

Reference to ‘Mitigation From Bank Worksheet’

<i>Referred to as</i>	<i>On Page(s)</i>
mitigation from bank worksheet	22, 23
Mitigation From Bank Worksheet	28

Reference to 'Restoration-Enhancement Worksh<space>'

<i>Referred to as</i>	<i>On Page(s)</i>
Restoration - Enhancement Mitigation	16
restoration - enhancement sheet	22
restoration - enhancement	23
Restoration and Enhancement Worksheet	24
Restoration/Enhancement Mitigation Table	25
Restoration/Enhancement Worksheet	26
restoration/enhancement worksheet	27

**SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

APPENDIX C

ENGINEERING INVESTIGATIONS

**SOUTHEAST LOUISIANA
URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

EXECUTIVE SUMMARY

The W-14 Canal Improvements, St. Tammany Parish, Louisiana 533(d) Report is being prepared to examine the feasibility of the City of Slidell, Louisiana, Southeast Louisiana Urban Flood Control Project (Slidell-SELA) located in the city of Slidell, St. Tammany Parish, Louisiana. The Slidell-SELA Project shall be referred to as the W-14 Canal Improvements Project. The purpose of the project is to improve flood control along the existing W-14 Canal that flows through a developed urban residential section of the city. The project is authorized under the Southeast Louisiana (SELA) Project. This report was produced by the U.S. Army Corps of Engineers (USACE), New Orleans District (MVN).

The W-14 Canal runs through the city, starting near the north end of the city, meandering predominantly south through several residential neighborhoods of the city into the Fritchie Marsh, and eventually draining into Lake Pontchartrain. The project includes improvements to approximately 4 miles of the existing W-14 Canal by clearing and snagging the canal 2 miles upstream of Fremaux Avenue, excavating a 10-ft wide trapezoidal section downstream of Fremaux Avenue to Daney Street, and a 40-ft wide trapezoidal section from Daney Street to immediately upstream of the I-10 Highway. Other improvements include the already constructed West Diversion Canal Detention Pond and the expansion of the Robert Boulevard Detention Pond. This attenuation pond will be deepened and provided with three lateral weirs. Finally, the Florida Avenue Bridge will be replaced with a 45-ft clear span bridge. This project is identified as the Reformulated Plan.

This Engineering Investigations appendix of the Section 533(d) report describes and details the preliminary analysis and design that has been completed to demonstrate the technical and economic feasibility of the Recommended Plan. This includes the preliminary hydraulic analysis completed to determine the proposed features impact on peak stages for various frequency storm events, the water quality analysis completed for determining construction methods to reduce sedimentation from entering the waters of the United States, the description of the basic geology of the project area, the geotechnical investigations completed for the preliminary designs of the project features, the descriptions, designs, calculations, and details completed for the preliminary design of the project, the descriptions and details of the necessary utility relocations due to the construction of the project, the development of the project cost estimate, and the development of a project implementation schedule. Due to this being a feasibility level report, more detailed analyses and designs for the project will be presented in a Design Documentation Report (DDR)

to be developed in conjunction with the development of the project's plans and specifications (P&S).

The Recommended Plan features are similar to the features proposed in the St. Tammany Parish, Louisiana Reconnaissance Study dated July 1996. The SA42 alternative plan with Bayer Ponds and Kings Point Pumping Station proposed in the 2009 533(d) Report proved upon analysis of issues raised by the ATR review to be economically unfeasible. Specifically, damages were over-estimated for the more frequent rainfall events due to a discrepancy in the elevations of the economically damaged infrastructure based on a datum unrelated to the one used in the hydraulic model geometry to estimate peak flooding stages. This report focuses in establishing the engineering soundness of the Recommended Plan. Except for the SA42 Alternative Plan with Bayer Ponds and Kings Point Pumping Station, and the two other plans reported in the 2009 533(d) Report, which are described herein for documentation purposes, all other alternative plans have been eliminated from consideration.

**SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

**APPENDIX C
ENGINEERING INVESTIGATION**

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SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

**APPENDIX C
ENGINEERING INVESTIGATION**

HYDROLOGY AND HYDRAULICS

GENERAL

The Southeast Louisiana Urban Flood Control Project, W-14 Canal Improvements Project is located in the city of Slidell, Louisiana, in southeast Louisiana and is encompassed by the Bayou Pattasat (an affluent of Bayou Bonfouca) and the W-14 Main Diversion Canal Drainage Basins. These basins have experienced significant rainfall flooding damage to homes and businesses from past rainfall flooding events. The W-14 Canal is a man made canal that runs east of the old city, starting on the north end of the city corporate boundaries, meandering predominantly south through several residential neighborhoods into the Fritchie Marsh, and eventually joining Salt Bayou at Little Lake before draining into Lake Pontchartrain. The project area is circumscribed to the city of Slidell, which is a subset of the study area. The study area is encompassed by the basins of the Bonfouca/Vincent (W-13) Bayous, W-14 Main Diversion Canal, and the Gum/French (W-15) branches. A typical reach of the existing W-14 Canal is shown as Figure 31. The SELA Project authorized improvements to the study area but this investigation focuses on the W-14 Canal within the limits of the city of Slidell.

The objective of the hydrology and hydraulics study is the development of a technically sound drainage improvement project for the W-14 Canal that, when subjected to the range of storm intensities in the study area, would reduce flooding damages in the project area. Authorized improvements provide level of protection for storms ranging in frequency from the 1- to the 500-yr events while trying to maintain the 10-yr event stages within the channel banks. Several improvements for the W-14 Canal were considered, analyzed, and preliminarily designed by the U.S. Army Corps of Engineers (USACE) to address the problems due to rainfall flooding in the city of Slidell and the surrounding areas. These improvements included clearing and de-snagging, enlarged trapezoidal channels, concrete lining the channel, creation of detention ponds, bridge replacements and installation of a pumping station. The results of the hydrologic and hydraulic modeling performed to substantiate the technical soundness of the recommended plan are

presented below after a description of the climatology, hydrology, hydraulic modeling and analyses of the alternative plans considered as possible solutions.

CLIMATOLOGY

Climate

The climate of the study (project) area is humid subtropical, but is subject to significant polar influences during winter, as cold air masses periodically move southward over the area displacing warm moist air. Prevailing southerly winds create a strong maritime character. This movement from the Gulf of Mexico helps to decrease the range between hot and cold temperatures and provides a source of abundant moisture and rainfall.

Temperature

Records of temperature are available from "Climatological Data" for Louisiana, published by the National Climatic Data Center. The study area can be described by using the normal temperature data observed at the Slidell WSFO station. Monthly and annual average normals of temperature from this station are presented in Table 1, based on the period from 1971 to 2000. The annual mean normal temperature is 67.5 °F, with the monthly mean temperature varying from 82.1 °F in July to 50.7 °F in January.

Since 1951, a maximum extreme temperature of 104 °F was recorded in the city of Slidell in June 1964 and a minimum extreme temperature of 8 °F was recorded in January 1985. Figure 1 shows the location of this climate gage.

Table 1
Mean Monthly and Annual Temperature (°F)
30-Year Normals (1971-2000)
(National Climatic Center)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Slidell WSFO	50.7	53.6	60.6	66.8	74.4	80.0	82.1	81.7	78.0	68.6	60.0	52.9	67.5

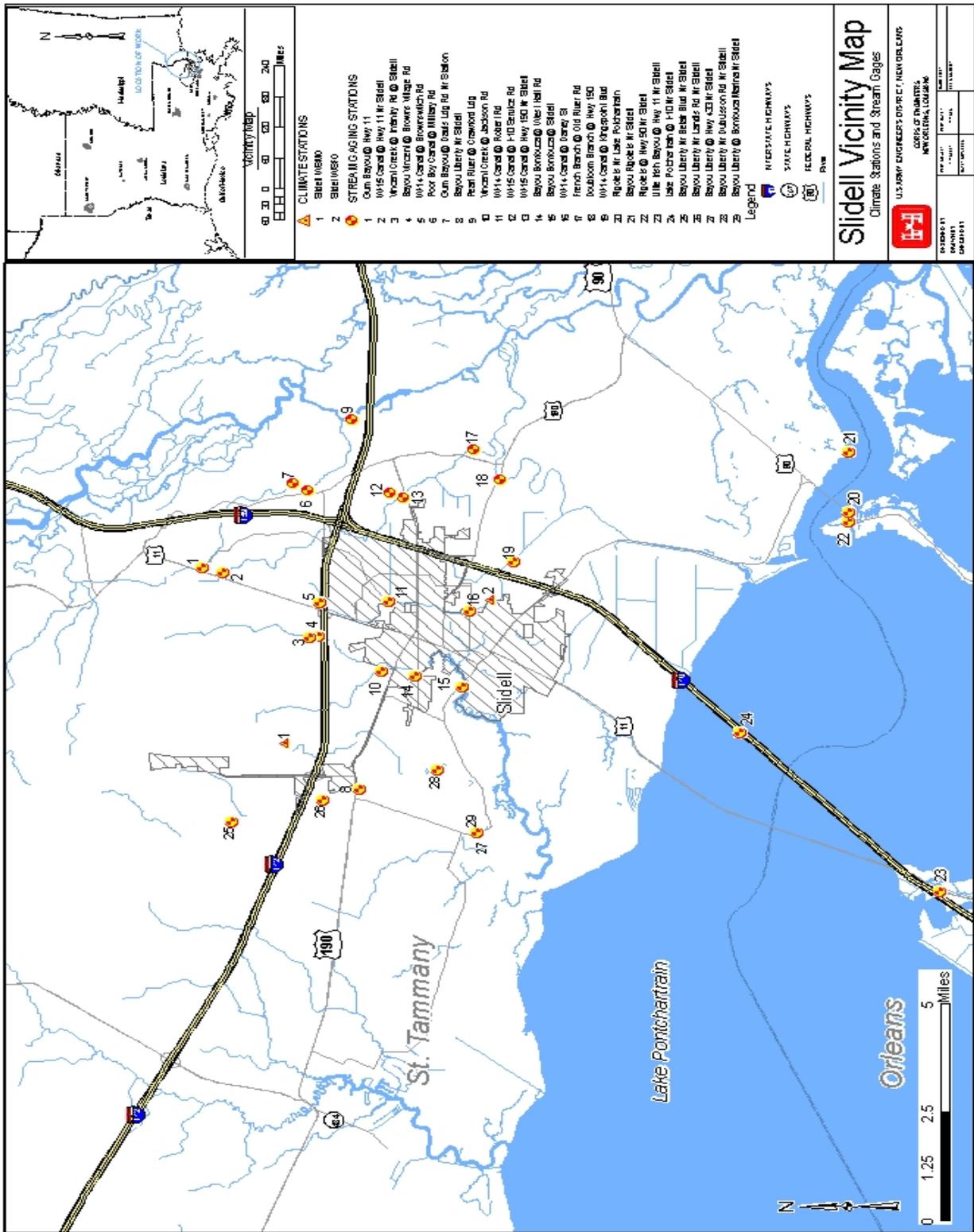


Figure 1 – Study Area Climate and Stream Gaging Stations

Precipitation

Records of precipitation are also available in publications by the National Climatic Data Center. Two stations in the Slidell area have been used to show the rainfall data for the study area. The Slidell WSFO station is maintained by the city of Slidell, and the Slidell WSMO station is operated by the National Weather Service. Table 2 gives the monthly and annual normals of precipitation at these two stations based on the period from 1971 to 2000. The average annual normal rainfall at this station is 61.42 inches with July being the wettest normal month with a monthly average of 6.84 inches. October is the driest normal month averaging 2.92 inches. The maximum monthly rainfall for both stations occurred in May 1995, with the Slidell WSFO station getting 26.14 inches and the Slidell WSMO station measuring 25.93 inches. The greatest day rainfall occurred on 10 May 1995 at both stations. The WSFO station received 13.42 inches and the WSMO station 11.36 inches. These stations are shown on Figure 1.

Table 2
Monthly and Annual Normal Precipitation (inches)
30-Year Normals (1971-2000)
(National Climatic Center)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Slidell WSFO	6.42	5.03	5.94	4.76	5.76	4.27	6.55	5.85	5.16	3.10	5.13	4.69	62.66
Slidell WSMO	6.14	4.34	6.28	4.46	5.76	4.20	7.13	5.64	4.34	2.74	4.55	4.59	60.17
Average	6.28	4.69	6.11	4.61	5.76	4.24	6.84	5.75	4.75	2.92	4.84	4.64	61.42

Wind

The average wind speed in the study area is 8.1 miles per hour (mph), based on the period from 1974-2007 at New Orleans International Airport. The predominant winds directions are north-northeast from September through February and south-southeast from March through June. The summer is often disturbed by tropical storms and hurricanes that produce the highest winds in the study area. Based on records over the last eleven years, the maximum 2-minute wind speed observed was 48 mph in January 1998, and the maximum 5-second wind speed was clocked at 64 mph in June 2004.

Stream Gaging Data

Stream gaging data are available from 29 gaging stations in the study area. All but two of these stations are maintained by the U.S. Geological Survey, which uses mostly the North American Vertical Datum of 1988 (N.A.V.D. 88). The stations, with their maximum and minimum stages, are shown in Table 3. Discharge records are not available in the study area. The stations' locations are shown on Figure 1.

Table 3
Stream Gaging Data

Slidell Area Partial-Record Gages	Period of	Max Stage	Date	Min Stage	Date
Gum Bayou @ Hwy 11	1998-07	27.48	6/11/01	N/A	-
W-15 Canal @ Hwy 11 nr Slidell	1998-07	27.64	7/1/03	N/A	-
Vincent Creek @ Infantry Rd @ Slidell	1998-02	15.57	6/11/01	N/A	-
Bayou Vincent @ Browns Village Rd	1998-07	15.82	6/11/01	N/A	-
W-14 Canal @ Brownsitch Rd	1998-07	17.70	6/11/01	N/A	-
Poor Boy Canal @ Military Rd @ Slidell	1998-02	11.52	6/11/01	N/A	-
Gum Bayou @ Davis Ldg Rd nr Slidell	1998-07	11.58	8/29/05	N/A	-
Bayou Liberty nr Slidell	1998-07	11.54	8/29/05	-0.64	1/14/06
Vincent Creek @ Jackson Rd nr Slidell	1998-02	10.35	6/11/01	N/A	-
W-14 Canal @ Roberts Rd	1986-87 & 98-02	13.82a	6/11/01	N/A	-
W-15 Canal @ I-10 Service Rd	1999-05	15.39	8/29/05	N/A	-
W-15 Canal @ Hwy 190 nr Slidell	1998-07	12.56	8/29/05	N/A	-
W-14 Canal @ Daney St	1998-07	11.25	8/29/05	N/A	-
French Branch @ Old River Rd @ Slidell	1998-02	7.22a	6/11/01	N/A	-
Pearl River @ Crawford Ldg nr Slidell	1999-02	7.52a	3/11/02	N/A	-
W-14 Canal @ Kingspoint Blvd @ Slidell	1998-02	4.44	6/11/01	-0.66	4/19/99
Bayou Liberty nr Landis Rd nr Slidell	2000-07	12.90	8/29/05	N/A	-
Bayou Liberty at Bonfouca Marina	2000-07	5.16	8/29/05	N/A	-
Bayou Liberty at Hwy 433 nr Slidell	2000-07	11.95	8/29/05	N/A	-
Bayou Liberty nr Belair Blvd nr Slidell	2000-07	19.38	8/29/05	N/A	-

Slidell Area Partial-Record Gages	Period of	Max Stage	Date	Min Stage	Date
Bayou Liberty nr Dubuisson Rd nr Slidell	2000-07	11.55	8/29/05	N/A	-
L. Pontchartrain @ I-10 nr Slidell	2005-07	9.97f	8/29/05	1.11	11/22/05
Doubloon Branch @ Hwy 190 @ Slidell	1998-02	5.81a	9/26/02	0.97	7/2/98
Rigolets nr Lake Pontchartrain (b)	1931-07	UND ad	8/29/05	-1.90a	1/26/38
Rigolets @ Hwy 90 nr Slidell	2004-07c	4.06e	8/29/05	-2.24	4/14/04
Little Irish Bayou at Hwy 11 nr Slidell	2002-07c	8.17e	8/29/05	-1.05	3/10/04
Bayou Rigolets nr Slidell	1992-98 & 98-02	6.38a	9/26/02	-4.91c	8/26/92
Bayou Bonfouca @ Slidell (b)	1962-92	6.80ad	8/18/69	-0.60a	2/15/63
Bayou Bonfouca @ West Hall Rd	1985-87 & 98-07	8.62	8/29/05	-0.83	1/26/00

- a. Datum of gage is N.A.V.D. 88
- b. USACE gage
- c. Continuous Record Gage
- d. Caused by hurricane
- e. Incomplete record due to hurricane (may have been higher)
- f. Datum of gage is assumed
- g. N/A Not Available
- h. UND Undetermined

Sources: U.S. Geological Survey Water-Data Reports LA-02 to LA-07
U.S. Geological Survey Baton Rouge Office
U.S. Army Corps of Engineers – New Orleans District

Floods and Storms of Record

Several floods have occurred in the study area from excessive rainfall caused by strong rainstorms including those generated by hurricanes and tropical storms. A listing of the major floods caused by rainfall is discussed below:

May 1958: One of the worst floods of record in the Slidell area occurred on 18 May, when 13.20 inches of rainfall in a 24 hour period was recorded at the Slidell WSFO gage. A high watermark of 7.1 feet N.G.V.D. 29 was recorded in the center of Slidell.

January 1966: During 3-5 January, heavy rain fell in Slidell and caused a high stage of 7.4 feet N.G.V.D. 29 on the gage at Bayou Vincent. The gage on Bayou Liberty near Slidell exceeded the 6.0 foot limit of gage. The Slidell WSFO gage recorded a storm total of 4.87 inches.

April 1983: Heavy rains produced the flood of April 1983. During 5-8 April, severe thunderstorms brought more than 10 inches of rain over some parts of the Lake Pontchartrain Basin. The storm caused wide-spread residential and commercial flooding. The stage on Bayou Bonfouca at the Slidell gage rose nearly two feet on 7 April.

April 1995: This rainstorm dumped 5 to 7 inches of rain on the Slidell area resulting in the flooding of approximately 100 homes on 11 April.

May 1995: This storm from 8-10 May caused severe flooding problems throughout the study area. More than 22 inches of torrential rain fell in the area over this short period, with nearly all of it falling on 9 and 10 May. The National Weather Service Office in Slidell (Slidell WSMO station) recorded 15.75 inches overnight. A high water mark of approximately 8.0 feet N.G.V.D. 29, was reported in downtown Slidell near the W-14 Canal.

Two minor rainstorms produced heavy rains during May and October 2007. The flooding was mostly confined to streets and low-lying areas. No homes were reported damaged. The storm in May occurred on the 29th and 30th and dropped 9.53 inches at the Slidell Airport. The 22 October rainstorm was caused by a cold front which dumped 5 inches of rain at the WSMO station gage by 3:00 p.m. This caused water levels to reach close to the top of the W-14 Canal and Bayou Bonfouca.

Hurricanes and Tropical Storms

Some flooding in the Slidell area has also been caused by high tides and heavy rainfall produced by hurricanes and tropical storms. Several of the maximum stage records have been set by these storms. Some of the significant hurricanes affecting the study area are: 1915 September-October hurricane, Hurricane Flossy in September 1956, Hurricane Hilda in October 1964, Hurricane Betsy in September 1965, Hurricane Camille in August 1969, Hurricane Carmen in September 1974, Hurricane Juan in October 1985, Hurricane Andrew in August 1992, Tropical Storm Frances in September 1998, Tropical Storm Allison in June 2001, Tropical Storm Isadore and Hurricane Lili in 2002, Hurricane Katrina in August 2005, and Hurricanes Gustav and Ike in 2008. Highlights of some of these storms are given below.

Hurricane Juan (October 1985): The prolonged stay of Hurricane Juan along the Louisiana coast was the cause of this flood. Maximum peak stages were set along the W-14 Canal, with the Daney Street gage and Robert Boulevard gage measuring 4.20 ft. N.G.V.D. 29 and 8.83 ft. N.G.V.D. 29, respectively, on 28 October.

Tropical Storm Frances (September 1998): Frances dumped between 6 and 8 inches of rain during the 9-14 September storm period. The Slidell WSFO station totaled 7.89 inches for this storm. Peak stages were set along Vincent Creek at the Jackson Road gage at 6.40 ft. N.A.V.D. 88, French Branch at Old River Road at 5.25 ft. N.A.V.D. 88, and Doubloon Branch at Highway 190 at 3.83 ft. N.A.V.D. 88.

Tropical Storm Allison (June 2001): Remnants of a very slow moving Allison caused heavy rainfall from 4-12 June that left several Slidell subdivisions flooded. Both Slidell rainfall gages received over 21 inches of rain with the WSMO station totaling 23.57 inches for the storm period.

Tropical Storm Isidore (September 2002): Isidore had a storm total of 9.36 inches of rain over a three day period from 25-27 September, at the Slidell WSFO station, with 6.82 inches falling on the 26th. The Slidell WSMO station measured 7.71 inches with 5.21 inches recorded on the 26th. Slidell received some damage from the backlash tidal surge on Lake Pontchartrain.

Hurricane Lili (October 2002): Lili affected the Slidell area one week after Tropical Storm Isidore soaked southeast Louisiana. The Slidell WSFO station had a storm total of 7.58 inches of rain from 3-6 October with 4.06 inches on the 4th, while the National Weather Service office (WSMO station) received 4.95 inches with 3.88 inches on the 4th.

Hurricane Katrina (August 2005): On August 29th, Hurricane Katrina sent a massive surge from Lake Pontchartrain into Slidell that flooded and destroyed most of the area. The surge was estimated to be 16.0 feet since most of the recording gages became inoperable. Portions of the I-10 bridge were uplifted and knocked into the lake. Rainfall accumulations varied between 8 to 10 inches according to the data retrieved, since most of these gages were destroyed.

Hurricane Gustav (September 2008): Gustav made landfall near Cocodrie, Louisiana on 1 September. The USGS gages, Lake Pontchartrain gage at I-10 near Slidell and Little Irish Bayou gage at Hwy 11 near Slidell recorded heights of 7.55 ft. and 5.14 ft., respectively. Slidell received an incomplete storm total of 7.17 inches, with 5.02 inches falling on the 2nd. Rainfall data for the 4th was missing.

Hurricane Ike (September 2008): The huge size and strength of Hurricane Ike raised water levels all along southern Louisiana as it passed just below the state before land falling near Galveston, Texas on 13th September. Rainfall was not a factor with the Slidell Airport having a storm total of only 1.24 inches. Peak stages had heights of 8.56 ft. at the USGS Lake Pontchartrain gage at Interstate 10 near Slidell and 5.63 ft. (5.58 ft. N.A.V.D. 88) at the Little Irish Bayou gage at Hwy 11 near Slidell, both on the 12th.

Tides

Tides in Lake Pontchartrain are diurnal, with a tidal range of 0 to 0.6 feet. The mean high water is approximately 1.6 feet N.G.V.D. 29 and the mean low water is approximately 1.0 feet N.G.V.D. 29. The mean annual high is 3.43 feet N.G.V.D. without considering hurricane induced high lake stages.

HYDROLOGY

Study Area Description

The study area encompasses the drainage system of the city of Slidell and surrounding vicinity. It is composed of a complex network of natural creeks and man-made canals. They include the Bayou Bonfouca/Bayou Vincent Canal (W-13), the Main Diversion Canal (W-14) and the Doubloon/French Branch Canals (W-15). The drainage basins for these canals although not well defined have been delineated as shown in Figure 2. The canal systems are partially separated by the embankments of Interstate 10 and the Southern Railway System. Cross flow between the canals can occur through underpasses, several diversion channels, or overland. The diversion channels include the W-14 West Diversion Canal connecting W-14 Canal to Bayou Vincent, the Reine Canal connecting the W-14 Canal to the W-15 Canal, and the Poor Boy Canal connecting the W-15 Canal to Gum Bayou.

The study area has several small industries. Most of the area is urban in nature, comprised of shopping centers, small commercial establishments, and numerous residential subdivisions. Based on comparison of aerial photos done for the St. Tammany Parish, Louisiana Reconnaissance Study (Reference 3), development in the study area appears to have been extensive and consistent in the W-13 and W-14 basins and relatively average in the W-15 basin.

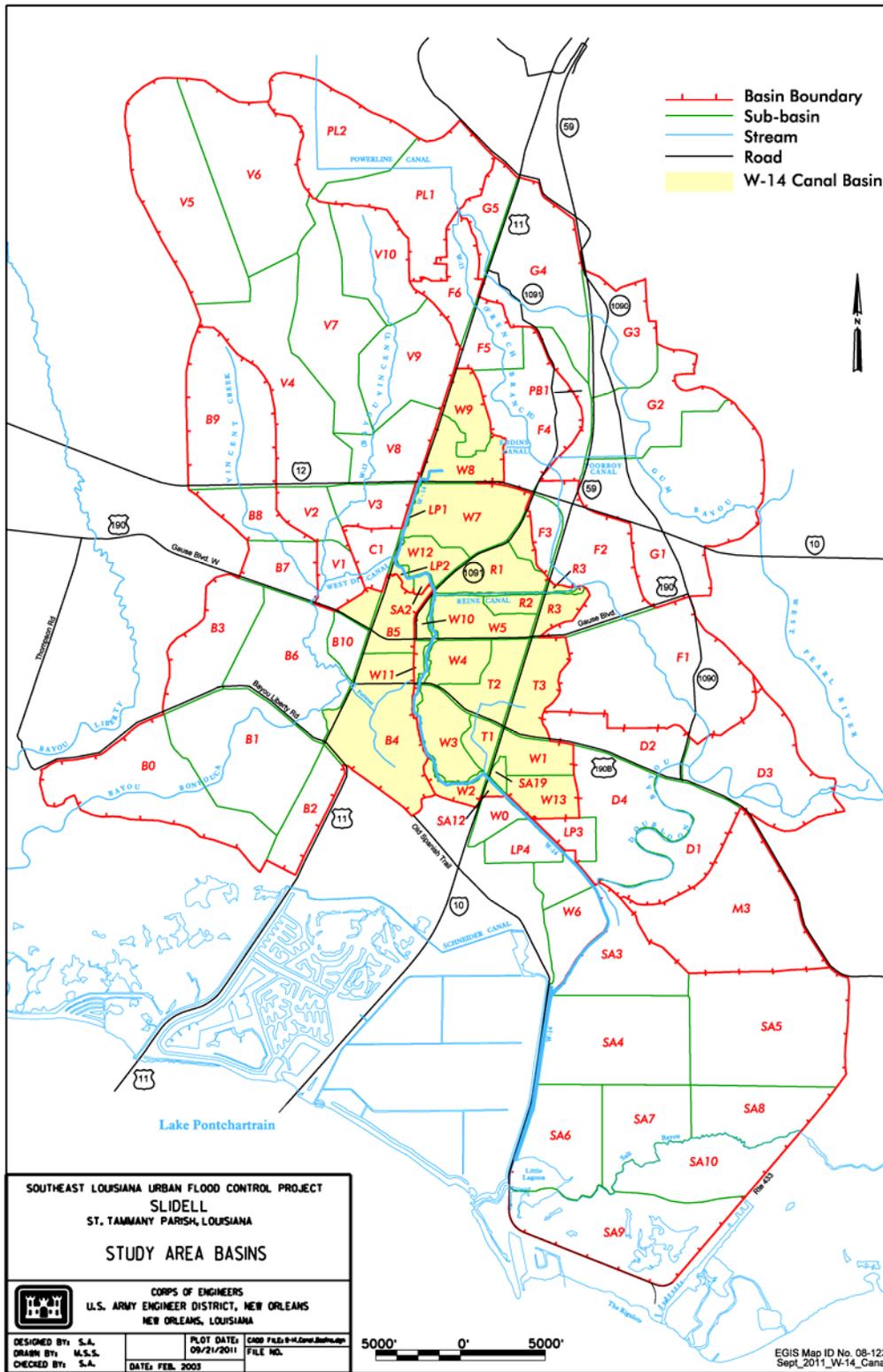


Figure 2. Study Area Basins

The W-14 Canal drains an 8 square mile area situated mainly east of its alignment and is approximately 10 miles in length, from its headwaters to its confluence with Salt Bayou near Lake Pontchartrain. The drainage basin has elevations varying from 2 feet to 25 feet N.A.V.D. 88. The W-13 Canal drains a 12.5 square mile area and measures 6 miles in length. Elevations in the drainage basin vary from 0 to 30 feet N.A.V.D. 88. The W-13 Canal drains into Lake Pontchartrain via Bayou Bonfouca. The Old Slidell area (situated west of the W-14 Canal alignment) runoff drains into Bayou Pattasat from where runoff is lifted by the City Barn Pumping Station (located west of Interstate 11) into Bayou Bonfouca. Construction of the W-14 Canal intersected the runoff of the Bayou Pattasat area east of the W-14 Canal alignment, which prior to construction contributed to the inflow into the pumping station, but that it now flows into the W-14 Canal through low areas on its eastern berm. The drainage basin for the W-15 Canal measures 12.1 square miles in area and varies in elevation from 5 to 30 feet N.A.V.D. 88. The W-15 Canal measures 7.5 miles in length and drains into Gum Bayou and eventually into the West Pearl River.

Methodology

The Frequency-Based Design Storm option was used due to no flow gage data being available for the potential flooding sources of the study area. Southern Regional Climate Center Technical Report 97-1 and National Oceanographic and Atmospheric Administration Technical Memorandum NWS HYDRO-35 were used as the sources of rainfall-depth-frequency-duration data for this study. The 2-hour duration event, not provided by the preceding references, was determined using the average of the 1-hour and 3-hour duration events.

The assumption was made that, on the average, a storm of any given frequency occurring over a basin will produce a flood of the same frequency for normal runoff conditions. Point rainfall depths were taken from isohyetal maps for durations ranging from 5 minutes to 2 days. This information was plotted on log-normal paper and a best fit equation was determined for each duration series. These equations were used to calculate the 99, 50, 20, 10, 4, 2, 1, and 0.2 percent exceedance probability rainfall totals for the 5- and 15-minute, the 1-, 2-, 3-, 6-, 12-, 24-hour, and the 2-day events. The 2-day rainfall total used to compute discharges was distributed based on the rainfall totals of the different duration events. See Table 4 for hypothetical rainfall distributions used in the analysis.

Table 4
Rainfall Depths (inches) for Hypothetical Storms, Slidell, Louisiana

Exceedance Probability	5 min	15 min	60 min	2 hr	3 hr	6 hr	12 hr	24 hr	2 day
99 %	0.49	1.07	2.04	2.18	2.31	2.94	3.77	4.25	5.02
50 %	0.56	1.21	2.43	2.87	3.30	4.00	5.00	5.65	6.50
20 %	0.65	1.40	2.95	3.78	4.60	5.41	6.61	7.51	8.45
10 %	0.72	1.54	3.35	4.47	5.59	6.48	7.83	8.91	9.93
4 %	0.81	1.73	3.87	5.39	6.90	7.89	9.45	10.77	11.88
2 %	0.88	1.87	4.26	6.08	7.88	8.95	10.67	12.18	13.36
1 %	0.94	2.02	4.66	6.77	8.87	10.02	11.89	13.58	14.84
0.2 %	1.10	2.35	5.57	8.37	11.17	12.49	14.73	16.84	18.27

The HEC-1 (flood hydrograph) model, previously developed by the A-E firm West Consultants for the UNET (unsteady water surface) hydraulic model, was the basis for the hydrology model development for the study. This HEC-1 model was used throughout most of the study process to develop inflow hydrographs for the hydraulic model with little modification to the basic structure of the model. The initial A-E hydraulic model development and calibration was based on this HEC-1 model.

Towards the end of the study process, the HEC-1 model was imported into HEC-HMS (currently used flood hydrograph program) by USACE personnel, and the subareas along W-14 Canal were modified extensively during the calibration process of the HEC-HMS model. The Tropical Storm Allison event was selected for calibration procedures due to the intensity of the storm and the availability of data. Sub areas were added and runoff characteristics were modified as necessary to achieve model calibration of this event.

Version 2.1.3 of HEC-HMS was used to calculate runoff for hypothetical storms of 100-, 50-, 20-, 10-, 4-, 2-, 1-, and 0.2% exceedance probabilities. Runoff hydrographs were computed with 5-minute time step intervals and were written to HEC-DSS files for use as lateral and uniform lateral inflows to the UNET hydraulic model.

HYDRAULIC MODELING

History of Model Development

The St. Tammany Parish, Louisiana Reconnaissance Study analyzed possible improvement alternatives for W-13, W-14 and W-15 Canals. HEC-1 and HEC-RAS

were used to model channel improvement alternatives; however, the modeling did not account for the interconnectivity of the basins through lateral channels and all hydraulic modeling was done in steady-state mode. The report recommended an unsteady analysis to account for the inter-basin connectivity of the systems.

A UNET model was created by the A-E firm West Consultants under contract to the USACE to satisfy this need for an interconnected network analysis of the system in unsteady flow mode. This model was completed in 1998 and was the basis for additional UNET model development leading to the USACE hydrology and hydraulics study reported in Reference (4) above. The latest USACE UNET model was converted into HEC-RAS format by the A-E firm West Consultants in 2008.

The A-E firm FTN modified the city of Slidell portion of the existing St. Tammany Parish UNET model developed by West Consultants (Teal, et al., 1998). FTN added bridge crossings (53), a detention basin, ponding (storage) areas (6), a pumping station, and a sheet pile weir to the UNET Model to update the model to represent existing (1999) conditions without any proposed improvements.

The USACE lost the ability to run UNET on desktop computer systems due to the installation of Windows XP. At the recommendation of the USACE, New Orleans District (MVN), the UNET model was converted to HEC-RAS. West Consultants was contracted to perform this work in early 2008. The AE contract scope required converting the UNET geometry, flow, and boundary condition files to a working model in the HEC-RAS format.

Modifications made to the HEC-RAS model geometry of the proposed SA42 plus Bayer Ponds and Kings Point Pumping Station Plan (to put the Old Slidell area in the same datum as the infrastructure elevation data) decreased annual flooding benefits to a value below the annual cost of the proposed project, turning it economically unfeasible. FIRM maps from FEMA indicated repetitive flooding taking place in Old Slidell and other subdivisions lying along the W-14 Canal alignment. However, HEC-RAS model stages in the canal did not capture these damages when compared to the economic areas infrastructure elevations. For this reason, in addition to correcting the datum, economic areas were modeled as storage areas (identical to the basins) to better capture the stages producing flooding damages. Whereas damages in basins (economic areas) draining into the W-14 Canal from the east were previously estimated by stages in the canal, the model geometry was reconfigured to represent these basins (economic areas) as storage areas. Bayou Pattasat that drains Old Slidell (south of Fremaux Avenue) was restored into the model geometry as well as Bayou Lane that drains the remaining Old Slidell area (north of Fremaux) into Bayou Bonfouca.

The above reconfigured model yielded stages more relevant to the economic areas but restoration in the model of the existing City Barn pumping station (that pumps Bayou Pattasat runoff into Bayou Bonfouca) yielded inundation damages in Old Slidell insufficient to restore the economic feasibility of the proposed SA42 plus Bayer ponds and Kings Point Pumping Station Plan. The PDT decided at this juncture to revert to a reformulated 1996 Reconnaissance project (The Recommended Plan) with features modified to have the largest impact in flood damage reduction thereby producing greater economic benefits. The hydraulic modeling of this Recommended Plan will be discussed in some detail in the following section of this report.

HEC-RAS (Hydraulic) Model

General Model Geometry

The initial model geometry was built using UNET, the predecessor to HEC-RAS. The 2000 UNET geometry file was imported into HEC-RAS by West Consultants in 2008 and cross sections were geo-referenced where possible using aerial photographs as background pictures. Cross section extensions added to the 2000 UNET model to capture the flood plain adjacent to the W-14 canal were deleted since as explained below the flood plain (basin) was represented in the Recommended Plan as storage areas.

The model of the Recommended Plan changed 21 basins adjacent to the W-14 canal into storage areas. These storage areas minus the 10 storage areas in Fritchie Marsh are shown in Figure 4. Storage areas stage-capacity relationships and lateral weirs station versus elevations were obtained in 2010 from FEMA's LIDAR database. This source is identical to the one used by Economics to obtain the infrastructure elevations.

The LIDAR data used to define storage areas elevations and ridge elevations are related to the NAVD88 (2004.65) datum. Elevations of the 2008 HEC-RAS conversion are in NGVD29 datum. NAVD88 elevations were adjusted to NGVD29 by adding 0.8 ft to the storage area and ridge elevations added to the HEC-RAS model geometry.

Reach 24 (Bayou Pattasat) in the UNET model was restored to the existing conditions HEC-RAS model in 2010 after obtaining from the City of Slidell the relevant features of City Barn pumping station and gated closure structure that control the discharge from this reach into Bayou Bonfouca. A list of the reach numbers and their descriptions is presented in Table 5.

Table 5
List of Rivers and Reaches

Reach No.	Name	Upstream Boundary	Downstream Boundary	Junctions	Comments
1	POWER LINE CANAL	None	2,3	JCT 1-2,3	FROM HEADWATER TO CONFLUENCE WITH GUM BAYOU
2	FRENCH BRANCH	1	4,12	JCT 1-2,3 JCT 2-4,12	FROM CONFLUENCE WITH POWERLINE CANAL TO CONFLUENCE WITH POORBOY CANAL
3	GUM BAYOU	1	11	JCT 1-2,3 JCT 4,3-11	FROM CONFLUENCE WITH POWERLINE CANAL TO CONFLUENCE WITH POORBOY CANAL
4	POORBOY CANAL	2	11	JCT 2-4,12 JCT 4,3-11	FROM CONFLUENCE WITH FRENCH BRANCH TO CONFLUENCE WITH GUM BAYOU
5	W-14 CANAL	SA W9	9,13	JCT 5-9,13	FROM HEADWATER TO CONFLUENCE WITH WEST DIVERSION CANAL
6	BAYOU VINCENT	None	SA 1	None	FROM HEADWATER TO LAKE BONTEMPS
7	BAYOU VINCENT	SA 1	9,10	JCT 7,9-10	PART OF BAYOU VINCENT FROM LAKE BONTEMPS TO WEST DIVERSION CANAL
8	BAYOU BONFOUCA	None	8	JCT 8,10-17	UPSTREAM PART OF BAYOU BONFOUCA TO CONFL. WITH BAYOU VINCENT
9	WEST DIVERSION CANAL	5	7	JCT 5-9,13 JCT 7,9-10	ENTIRE REACH
10	BAYOU VINCENT	7,9	17	JCT 7,9-10 JCT 8,10-17	BAYOU VINCENT BETWEEN WEST DIV. CANAL AND CONFL. W/BONFOUCA
11	GUM BAYOU	3	Pearl River	JCT 4,3-11	GUM BAYOU DOWNSTREAM OF POORBOY CANAL TO PEARL RIVER

Table 5 (cont'd)
List of Rivers and Reaches

Reach No.	Name	Upstream Boundary	Downstream Boundary	Junctions	Comments
12	FRENCH BRANCH	4	15	JCT 2-4,12 JCT 12,14-15	FRENCH BRANCH DOWNSTREAM OF POORBOY TO REINE CANAL
13	W-14 CANAL	5	14,16	JCT 5-9,13 JCT 13-14,16	W-14 CANAL BETWEEN WEST DIVERSION CANAL AND REINE CANAL
14	REINE CANAL	13	15	JCT 13-14,16 JCT 12,14-15	ENTIRE REACH
15	FRENCH BRANCH	12, 14	18	JCT 12,14-15 JCT 15,19-18	FRENCH BRANCH FROM REINE CANAL TO CONFLUENCE WITH DOUBLOON BRANCH
16	W-14 CANAL	13	22	JCT 13-14,16 JCT 16,21-22	W-14 CANAL DOWNSTREAM OF REINE CANAL TO W-14 TRIBUTARY
17	BAYOU BONFOUCA	8, 10	11	JCT 8,10-17 JCT 1,17-11	MIDDLE PART OF BAYOU BONFOUCA TO JCT WITH BAYOU LANE
18	DOUBLOON BRANCH	15,19	Pearl River	JCT 15,19-18	DOUBLOON BRANCH FROM FRENCH BRANCH TO PEARL RIVER
19	DOUBLOON BRANCH	SA 3	18	JCT 15,19-18	DOUBLOON BRANCH FROM FRENCH BRANCH TO FRITCHIE MARSH
20	SALT BAYOU	Pearl River	Lake Ponchartrain	None	ENTIRE REACH
21	W-14 TRIBUTARY	None	20	JCT 1,21-20	UPPER PART OF W-14 TRIBUTARY
22	W-14 CANAL	16,20	SA 6	JCT 16,20-22	W-14 CANAL FROM CONFLUENCE WITH W-14 TRIBUTARY TO LITTLE LAGOON
23	LATERAL DIVERSION	SA 13	SA 3	None	DIVERSION TO FRITCHIE MARSH FROM W-14 CANAL
24	BAYOU PATTASAT	SA B4	City Barn	Pump Station	ENTIRE REACH FROM AREA B4 TO PUMP STATION

Structure Internal Cross Sections

West Consultants removed most of the internal cross sections in the UNET model bridge/culvert input data after importing them into HEC-RAS. Where the cross section geometry inside the bridge differed from the upstream and downstream (bounding) cross sections, West Consultants modified the internal cross sections in the bridge/culvert input data in HEC-RAS to match the bounding cross sections. Successful running of the recommended plan in 2010 required additional matching of internal to bounding cross sections. Several internal cross sections lengths were also modified to avoid structures (culverts or bridges) being longer than the distance between the bounding cross sections.

Bridges and Culverts

Deck information for several of the bridges was not surveyed or the span of the deck did not extend far enough to cover the width of banks. In these cases, West Consultants modified the deck with assumptions noted in the model. The horizontal position (stationing) of the culverts or the internal cross section geometry was also modified in several cases to accommodate the culvert geometry.

The top of crown elevation of some culverts in the UNET geometry was higher than the top of deck elevation. Therefore, the deck elevation was increased to prevent weir flow before the culvert is full.

Lateral Weirs

In the HEC-RAS model, lateral weir coefficients were assumed equal to 2 for all structures, except for inline structures, where the more appropriate UNET model weir coefficient values ranging from 2.6 to 3 were adopted.

West Consultants modified the profiles of very long weirs by adding 0.01 feet to the upstream end crest elevation and subtracting 0.01 feet from the downstream end crest elevation for computational stability. When lateral weirs extended past an internal structure, which HEC-RAS does not allow, the structure length was adjusted accordingly to prevent an error message.

Lateral weirs connecting the storage areas to the W-14 Canal were replaced in the Recommended Plan model geometry with profiles of both canal berms digitized from LIDAR data. These digitized data was also used to delineate the profile of the roads, ridges, and other boundaries separating the storage areas.

Ineffective Flow Limits and Levees

Ineffective flow limits entered by West Consultants to account for expansion and contraction of effective flow at bridge and culvert crossings were extensively modified to obtain a computationally stable Recommended Plan model. Levees were also added where necessary.

Pilot Channels

Pilot channels entered by West Consultants where the channel profile is irregular with steep and sudden changes in slope were revised in 2010 as needed where the model had difficulties converging. HEC-RAS does not rely on pilot channels for larger flows because when the depth of flow exceeds the pilot channel depth the maximum water surface elevations and peak flow rates in the reaches are not affected by entering or removing pilot channels.

Because pilot channels do not extend inside inline structures, small “dummy” culverts (on the order of 1 square foot of cross sectional area) were added at selected locations along Reach 4, Reach 9 (see Figure 3), Reach 14, and Reach 21 to improve model convergence for low flows.

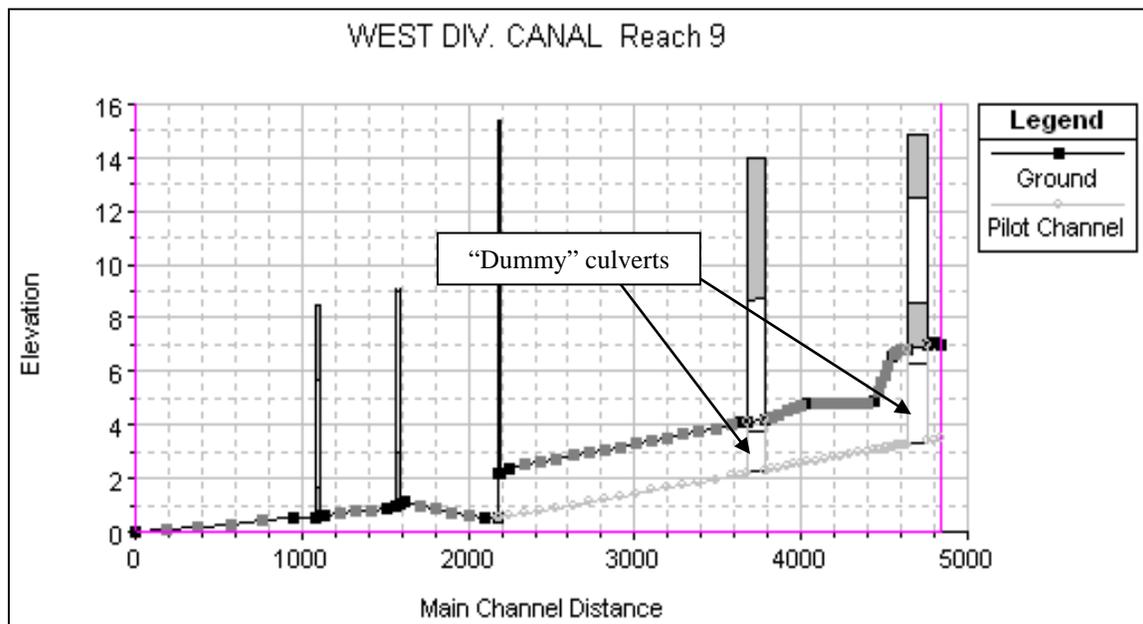


Figure 3. Example of Pilot Channels and “Dummy” Culverts

Interpolated Cross Sections

Interpolated cross sections were added to most of the reaches to smooth transitions between the geometry of surveyed cross sections. A maximum cross section spacing of 400 feet was maintained throughout the system. Where sudden changes in cross section geometry or bottom elevations were encountered, smaller downstream distances between the cross sections were used.

Hot Start Run and “Dummy” Storage Areas

The model had difficulties converging during low flows. A low-flow solution was obtained by first creating a hot start file with an initial water surface elevation of 15 feet in the reaches and storage areas. As the simulation progressed, the boundary water surface elevation was steadily reduced to obtain a steady state initial condition which was saved in a hot start file. This file with the steady state initial conditions was read by the program for each storm event simulation before applying the hydrographs. Besides helping reveal model elements causing the model to crash, such as bridges, culverts, and lateral weirs, this process allowed establishing steady state initial conditions for all the rivers in the system that correspond to pre-established boundary conditions with empty storage areas. These storage areas conditions were assumed to be similar to average basin conditions antecedent a storm without and with a project in place. Due to the modeling approach using a high initial water surface elevation of 15 feet, dummy storage areas (labeled D-SA2, D-SA3, D-SA4, D-SA6, etc) and gates were necessary to lower the water surface elevation in the storage areas. The gates connecting those storage areas were closed at the end of the hot start simulation and remained closed during the storm events.

Inline Weirs

Two inline weirs were entered, one at HEC-RAS station 0.4864 in Reach 9 (“West Diversion Canal”) and one at station 0.5005 in Reach 20 (“Salt Bayou”), to resolve model instabilities due to the bottom elevation of the channel experiencing a sudden drop. The stationing is a numbering format used by HEC-RAS and differs from the stationing used to design the project features.

Filled-In Sediment Elevations

At HEC-RAS station 1.412 in Reach 21 (“W-14 Tributary”), the channel invert at the upstream face of the culvert is lower than the culvert invert elevation. This creates instability in the model solution for low flows. Adding pilot channels did not help

resolve the instability. To stabilize the computation it was assumed that sediment would fill the drop, raising the channel invert to match the culvert invert elevation.

Boundary and Initial Storage Conditions

Table 6 presents a summary of the HEC-RAS initial water surface elevations obtained for the storage areas after running the Hot Start file. The Hot Start file runs long enough (72-hrs) so as to obtain steady state conditions corresponding to the streams downstream boundary and stages as close to empty as possible in the storage areas. Some of the initial stages are below the bottom of the storage areas because these have been lowered in the model geometry input to match the bottom of the canal in order to stabilize the computations. Given that the volumes added below the true bottom of the storage areas are very small, having initial stages below them, does not significantly affected the reported peak stages. Flow data for each return period was imported from the HEC-HMS model output. The downstream boundary was set equal to the Lake Pontchartrain Mean Annual High Tide. Inflow hydrographs were added to HEC-RAS at selected locations along the reaches and into the storage areas. Figure 4 shows the locations of the storage areas.

Model Calibration

FTN verified the existing conditions model on the April 11, 1995 storm event. Local historical rainfall data was input to the HEC-1 model and the resulting hydrographs were input to UNET as lateral and uniform lateral inflows. Predicted water surface elevations were all within 0.5 ft from existing high water marks between miles 0 to 8 of the W-14 Canal. Predicted water surface elevations on the West Diversion Canal were within 0.25 ft.

The existing conditions model converted to HEC-RAS was verified on the June 2001 Tropical Storm Allison event. Total daily rainfall depths were distributed using hourly recorded data as a pattern for several gages along the W-14 canal and input to the hydrological model. The resulting hydrographs were input as lateral and uniform lateral inflows. Manning's "n" values were adjusted along the W-14 Canal as necessary to facilitate model calibration of the existing without project model.

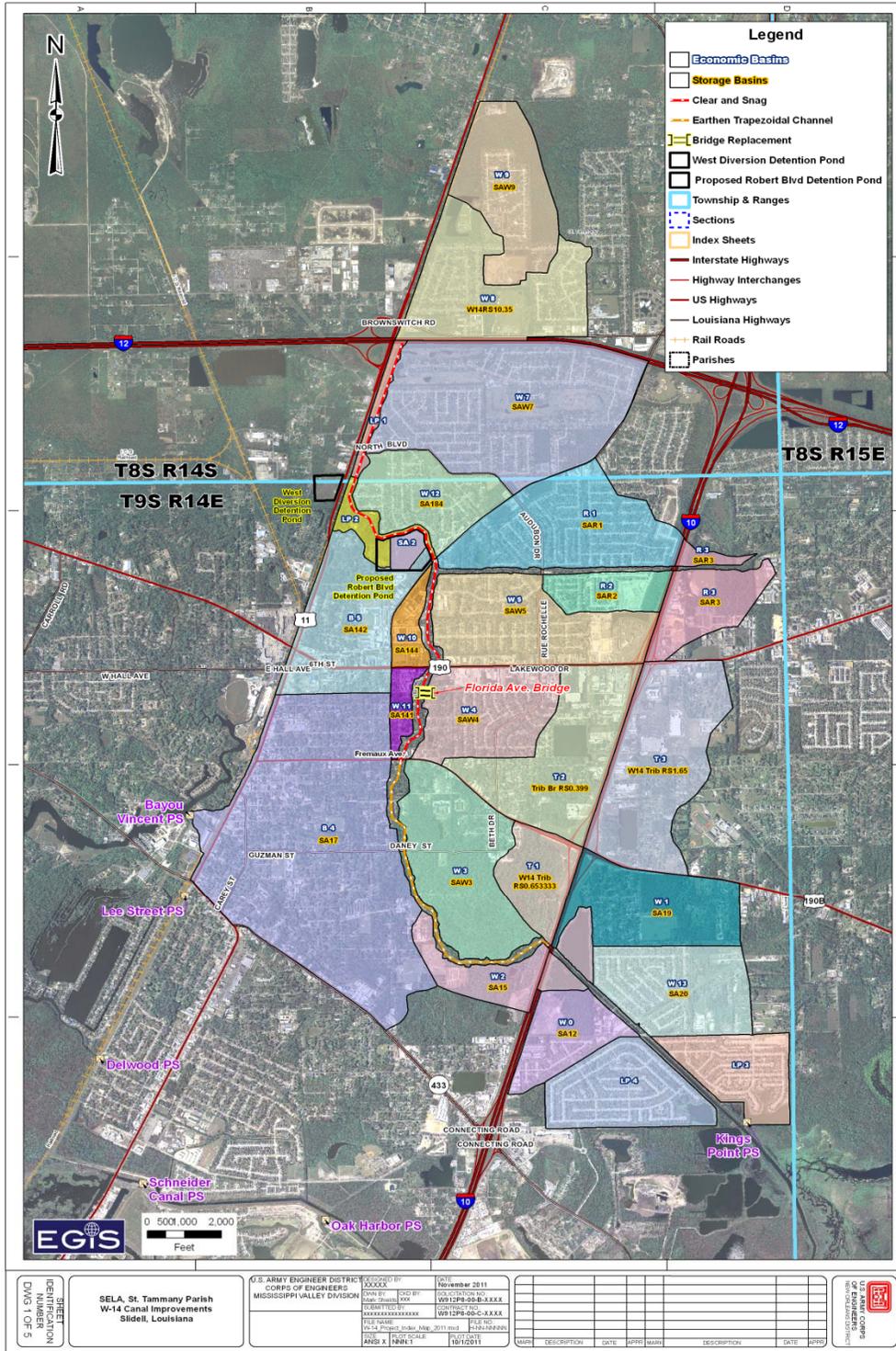


Figure 4. Storage Areas and Economic Reaches

Table 6
Initial Storage Water Surface Elevations

STORAGE AREA	Storage Area Bottom Elevation (ft)	HEC-RAS Model Initial Water Surface Elevation (ft)	COMMENTS
1	-5.0	6.1	Inline storage. The WS elevation depends on the US and DS reaches.
10	0.7	3.7	
11	0.7	3.7	
12	-1.0	3.7	Lateral weir elevation is set at -1 ft. The storage drains into the canal until equilibrium is reached.
13	-4.0	3.8	Connected to Reach 23. The storage drains into the stream until equilibrium is reached.
W11	7.8	6.8	Bottom lowered to match bottom of W-14 Canal
B5	8.8	4.9	Bottom lowered to match bottom of Bayou Lane
W10	10.8	9.8	Bottom lowered to match bottom of W-14 canal
W2	0.8	0.8	
B4-2	-2.2	-4.2	
B4-1	-2.2	-3.7	
W9	12.8	13.2	
W7	11.8	7.8	Bottom lowered to match bottom of W-14 Canal
W5	10.8	7.8	Bottom lowered to match bottom of W-14 Canal
W12	11.8	8.8	Bottom lowered to match bottom of W-14 Canal
W1	4.8	3.8	Bottom lowered to match bottom of W-14 Canal
2	1.8	4.9	Robert Boulevard Pond. Three weirs with culverts connect the pond to the W-14 Canal. The WS elevation in the pond is at equilibrium.
W13	3.8	3.7	

STORAGE AREA	Storage Area Bottom Elevation (ft)	HEC-RAS Model Initial Water Surface Elevation (ft)	COMMENTS
W3	4.8	3.8	Bottom lowered to match bottom of W-14 Canal
W4	8.8	8.8	
R1	11.8	11.8	
R2	11.8	10.8	Bottom lowered to match bottom of W-14 Canal
R3	7.8	5.8	Bottom lowered to match bottom of canal
8	0.7	3.7	
9	0.7	3.7	

DESIGN ANALYSIS

After testing the technical and economic feasibility of many alternatives, the Project Delivery Team determined to test the feasibility of the Recommended Plan. The features comprising this plan are very similar to the 1996 Reconnaissance Study plan features with minor deviations described below. Several other improvement alternatives were tested starting in 1998 when FTN studied five different plans to find the most effective at reducing flood elevations within the canal. FTN analysis of five alternative improvements, consisting of earthen and concrete trapezoidal canals working jointly with an improved Robert Boulevard detention pond, focused in sizing these features to accommodate the 4-percent exceedance storm event within the channel. This analysis proved inconclusive due primarily to the inability to increase channel top widths in many locations along the canal due to encroaching structures and roadways.

With the same objective of containing the 4-percent exceedance storm event within the channel, a decision was made subsequent to the FTN analysis, to study three new alternative designs. Three additional plans were analyzed and reported in Reference (4) as three alternatives having in common an improved W-14 Canal plus either attenuation storage, flume or a pumping station. Each alternative would have a common improved W-14 Canal along with either, detention storage capability, a flume option or a pumping station at Kings Point. The features of these alternatives were with minor modifications the same features of the alternatives analyzed using the 2008 HEC-RAS model conversion. Water surface profiles of these three alternatives reported in Reference (4),

demonstrated that only the inclusion of a 130 acre detention pond immediately upstream of the existing Interstate 10 bridge with a 2100' long lateral broad crested weir and two flap-gated 2' diameter circular concrete culverts, connecting to the W-14 Canal, in addition to the common features, met the project objective. Both the pumping station and flume alternatives resulted in with-project induced flooding upstream of the Interstate 10 existing bridge.

Using the 2008 HEC-RAS conversion, stages at preselected locations of the W-14 Canal, intended to represent stages in adjacent economic areas, were estimated for nine frequency storms and reported in the draft 533 (d) report submitted for review to MVD in 2009. In May 2010, MVD questioned unexpected flooding occurring for the 50-percent exceedance probability storm in the Old City of Slidell economic area. Review of this apparent anomaly revealed that the bottom of the storage areas representing the City of Slidell economic area in the model geometry of the recommended plan (SA42 with Bayer Ponds and Kings Point Pumping Station) was too high, therefore yielding the anomalously high peak stages noted by MVD. Revision of this anomaly, restricted to the Old City of Slidell economic area, yielded more reasonable flooding stages that however resulted in a benefit to cost ratio lesser than one for the recommended plan. At this juncture, the PDT expanded the model configuration upgrade to encompass the entire W-14 Canal and Bayou Pattasat watersheds to adequately assess project damages and benefits. The Recommended Plan described below is the result of this latest design analysis.

RECOMMENDED PLAN

The recommended plan includes clearing and snagging, channel conveyance improvement, attenuation capability expansion and relocation of the Florida Avenue bridge, as detailed below:

Clearing and snagging will consist of complete removal above the ground surface and disposal of down timber snags, brush, bushes, loose roots, rubbish and similar debris within the channel between Interstate 12 and Fremaux Avenue. Lower Manning's "n" values are used in the with-project model to account for the lower resistance to flow resulting from this improvement of the W-14 Canal.

Excavation of an earthen 10' bottom width trapezoidal channel with 3H:1V side slopes from the downstream side of the existing Fremaux Avenue bridge to the upstream side of the existing Daney Street bridge.

Excavation of an earthen 40' bottom width trapezoidal channel with 3H:1V side slopes from the downstream side of the existing Daney Street bridge to the upstream side of the existing Interstate 10 bridge.

A previously constructed detention pond on the West Diversion canal alignment immediately west of U.S. Highway 11. The 13.8 acres impoundment is created by an earth embankment with crest elevation at 14.5' and by an excavated gradually sloping bottom starting at elevation 7' and ending in collecting ditches with bottom elevations varying from elevation 6' to 5.5'. The embankment slopes are seeded and fertilized and a 20' wide aggregate road built on the embankment crest provides access for maintenance. A 117"x79" bituminous coated CMPA drains the pond into the West Diversion canal in route to its junction with Vincent Bayou.

Enlargement of the existing 19.6 acre Robert Boulevard Pond and reconstruction of three existing sheet pile weirs. The pond footprint would be increased by 11.57 acres and the combined total area of 31.17 acres deepened to a gradually sloping bottom elevation starting at elevation 1.5'. Two of the three weirs would have culverts provided with flap gates at their downstream end to prevent backflow from the canal into the pond.

Relocation of the existing Florida Avenue bridge will consist of its replacement with a 45' clear span two lane bridge and the construction of a transition starting upstream of the new bridge and ending at the downstream end of the existing armoring of the canal banks done for the recently built hospital culvert.

ALTERNATIVE PLANS REPORTED IN 2009

The features of the plans discarded upon adoption of the Recommended Plan in 2010 are reproduced below for documentation purposes and to facilitate review of this revised report. The Alternative Plan SA 42 is the Detention Storage Plan reported in Reference (4) with the deviations described below. The cost of these plans proved too expensive for the benefits derived from their implementation.

Alternative Plan SA42

Alternative Plan SA42 included all the improvements listed below, but did not include the 130 acre pond or the planned Bayer Ponds, as features.

An improved channel from the downstream side of the existing North Boulevard Bridge to the upstream side of the proposed Robert Boulevard weir consisting of a 30' wide rectangular channel with sheet pile walls lined with concrete and a concrete bottom.

Improvements to the existing Robert Boulevard detention pond included deepening the invert of the pond to +1.5' and expanding the surface area to a total of 30.3 acres. The pond would have had a lateral broad crested weir constructed to connect the pond to the W-14 Canal. The weir would have had a top elevation of +5.8' and a length of 100'. A weir coefficient of 3.0 was used to model weir flow. The pond would have been drained by one 24" reinforced concrete pipe (RCP) approximately 25' in length with an invert elevation of +1.5'. The culverts were modeled as having square edge entrances and exits with headwalls that drained immediately upstream of the Robert Boulevard bridge.

An improved channel from the downstream side of the proposed Robert Boulevard weir to the upstream side of the Independence Drive Bridge consisting of a 45' wide rectangular channel with sheet pile walls lined with concrete and a concrete bottom.

Replacement of the existing Independence Drive Bridge with a new 45' clear span bridge with vertical walls and a 40' wide deck.

An improved channel from the downstream side of the new Independence Drive Bridge to the upstream side of the existing Gause Boulevard culverts consisting of a 45' wide rectangular channel with sheet pile walls lined with concrete and a concrete bottom.

An improved channel from the downstream side of the existing Gause Boulevard culverts to the upstream side of the new Florida Avenue Bridge consisting of a 45' wide rectangular channel with sheet pile walls lined with concrete and a concrete bottom.

Replacement of the existing Florida Avenue Bridge with a new 45' clear span bridge with vertical walls and a 40' wide deck.

An improved channel from the downstream side of the new Florida Avenue Bridge to the upstream side of the existing Fremaux Avenue Bridge consisting of a 45' wide rectangular channel with sheet pile walls lined with concrete and a concrete bottom.

Replacement of the existing Cousin Street Bridge with a new 45' clear span bridge with a 34' wide deck .

An improved channel from the downstream side of the Fremaux Avenue Bridge to the upstream side of the Daney Street Bridge. The channel was designed as an earthen trapezoidal channel with 10' wide bottom and 3:2 side slopes.

A new detention pond with a lateral broad crested weir connected to the W-14 Canal was added to the model immediately upstream of the Daney Street Bridge. The weir has a 100 feet length and a crest elevation of 4.5 feet. The Daney Street pond had a surface area of 30 acres and an invert elevation of -3.5'. It was drained by a 24" RCP, approximately 35' in length with an invert elevation of -3.5'.

An improved channel from the downstream side of the Daney Street Bridge to the upstream side of the Interstate 10 Bridge. The channel is designed to be an earthen trapezoidal channel with 40' wide bottom and 3:1 side slopes.

The W-14 Canal improvements were added to the HEC-RAS model geometry using invert channel slopes from the UNET SA42 model, except for the reach between Daney Street and Interstate 10. In this reach, an invert sloping from an elevation of -3 feet at Daney Street to an elevation of -4 feet at Interstate 10 was used.

Alternative Plan SA42 with Bayer Ponds

To account for the Bayer Ponds proposed by the Summit Fremaux developer, a new geometry file was created with the proposed Bayer Ponds added to the Plan SA42 geometry file. The left overbank area of the W-14 Canal was adjusted to match the planned weir elevation of 2 feet. The two ponds provide 26 acres of storage area and have a minimum bottom elevation of -15.0'. Flow data and downstream boundary conditions remained unchanged from the Plan SA42 simulations.

Alternative Plan SA42 with Pumping Station Alternative

This alternative incorporated a new pump station at the Kings Point Levee (see Figure5) upstream of the existing pumping station. The proposed pumping station would have featured five pumps built in separate bays each with a capacity of 590 cfs @ 17' TDH. The pump curve used in the model is presented in Table 7. Two new geometry files were created by adding the pump station to 'Plan SA42' and 'Plan SA42 with Bayer Ponds' geometry files. The pumps startup was staggered starting with the first pump to be turned on/off at 2.0/0.0 feet, and followed by each successive pump in increments of 0.25', with the last (fifth) pump turned on/off at El. 3.0/1.0 feet. The staggering was introduced to avoid transient waves if all five pumps were to start and shut off at the exact same water surface elevation.

The purpose of the pumping station was to avoid flooding during normal operating conditions. Normal operations would have prevailed up to the 10% exceedance event happening concurrently with lake stages as high as the Mean Annual Hightide. The USACE proposed adding three gated bays to the pumping station. The gates would've

been fully closed during exceptional conditions, defined as when the above mentioned lake Mean Annual High Stage is likely to be exceeded due to, an impending storm. Otherwise, during normal operating conditions the gates could be partially open to assist the pumps to discharge runoff downstream of the structure. Once the gate is closed during exceptional conditions all the runoff would be pumped over the pumping station discharge deck. The discharge deck has been set at Elevation 13.0. The pumping station would have been capable of handling without inducements most events except for the 0.4-percent and less frequent exceedance events.



Figure 5. Kings Point Pumping Station

Table 7
Pump Curve for Kings Point Pump Station

Head (ft)	Flow (cfs)
0	660
10	625
17	590
23	550
32	500
43	400
49	300
52	200
54.5	100
58.5	0

RESULTS OF THE RECOMMENDED PLAN HYDRAULIC MODELING

Water surface elevations (stages) at 21 economic areas for 8 frequency events resulting from modeling existing with and without project and future with and without project are presented below for the Recommended Plan. Because local ordinances prohibit post-development discharges to exceed pre-development values the impact of increases in future land use on runoff has been disregarded and the same hydrology has been adopted for both existing and future conditions. The reduction in stages upstream of I-10 that would result from implementation of the Recommended Plan is shown graphically in Figure 6.

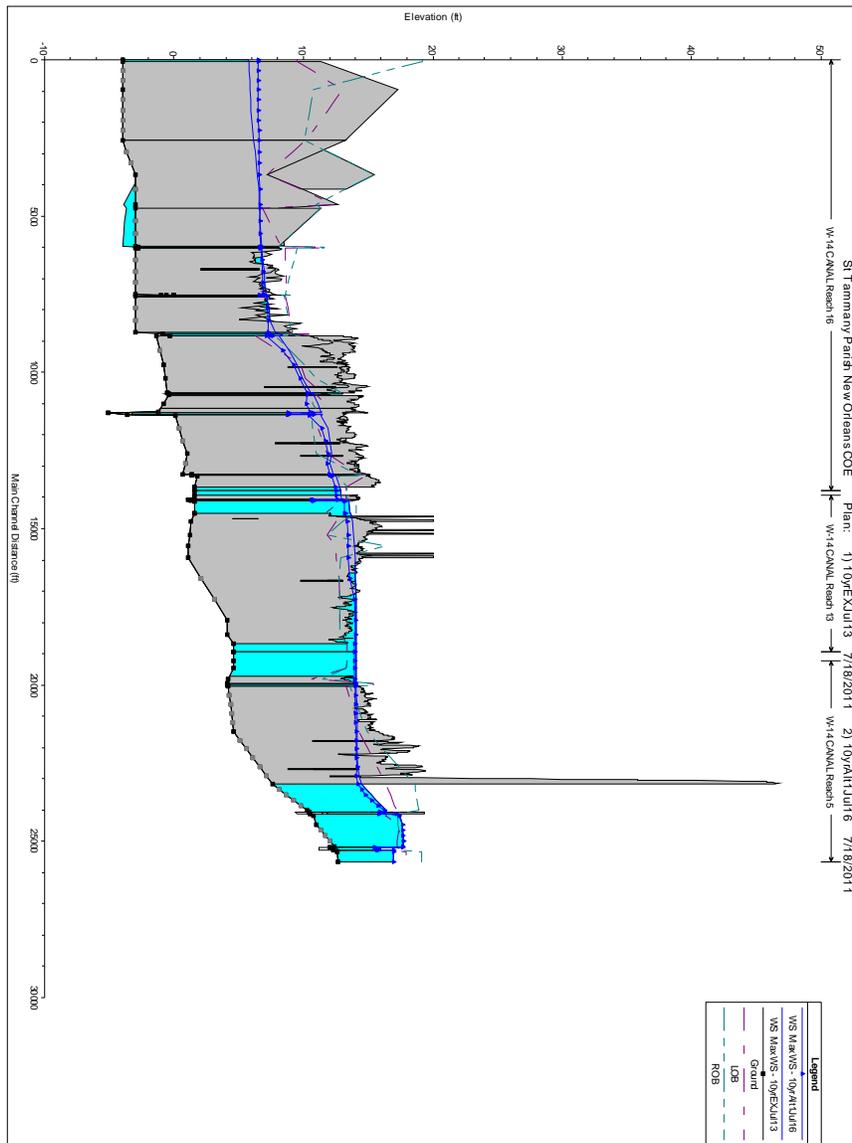


Figure 6. Reformulated and Existing Condition 10-yr Stages

Relative Sea Level Change

Corps regulations (EC 1165-2-211) require that sea level change impact must be considered in evaluating projects throughout their life span. A best linear fit to 50-years of daily stages for the U.S. Army Corps of Engineers Rigolets gage (85700) yielded a historic relative sea level rise of 4.7 mm/yr. Low, intermediate, and high rate values of relative sea level were estimated in accordance with the above circular and are shown in the Table 8 below.

Table 8
Relative Sea Level Change Estimates, ft

Rate	Low	Intermediate	High
2017	0.0	0.0	0.0
2027	0.2	0.2	0.4
2037	0.3	0.4	0.8
2047	0.5	0.7	1.3
2057	0.6	0.9	1.8
2067	0.8	1.2	2.5

Relative sea level change is the result of two phenomena: subsidence and eustatic (global) sea level rise. Since the historic eustatic rate of sea level rise is estimated at 1.7 mm/yr, the difference (3 mm/yr) is attributed to subsidence. In Table 8 above, 0.3 ft of the 2067 estimates can be attributed to eustatic sea level rise. The remainder is attributed to subsidence. After consulting with various centers of expertise, the HEC-RAS model geometry elevations for the study area were reduced by the subsidence rate, i.e., by a value of 0.5' and the downstream boundary stages were raised by the eustatic sea level rise. The stages presented herein for future with and without conditions are estimated for the intermediate sea level rise over the life of the project.

Project Sensitivity to High Rate of Sea Level Change

The intermediate rate of sea level rise was used to determine future conditions stages for the 8 hypothetical rainfall events. A sensitivity analysis was performed to determine the backwater effect in the project area for the high rate of sea level rise. The downstream boundary stage was raised by 2.0 ft to 5.43 ft NGVD for this high sea level rise simulation at the same time that the study area model geometry was reduced by the subsidence value of 0.5 ft. For the 100 year rainfall event, this analysis resulted in higher peak stages in the W-14 Canal as far upstream as the Fremaux Avenue Bridge. Possible measures to reduce flooding due to these higher stages would include building up the canal banks to reduce out-of-bank flow or a floodgate and pump station in the W-14 Canal near the downstream end. In order for the project design to minimize damages in the high relative sea level rise scenario, the banks of the W-14 Canal between the project limits would be raised to an elevation sufficiently high to contain the anticipated profile thereby maintaining flood risk reduction throughout the design life of the project under all possible sea level rise scenarios. Any development of areas within the jurisdiction of local sponsors that are affected by the raised banks would have to comply with Federal regulations for floodplain development controlling the quantity and quality of their discharges into the W-14 Canal. Figure 7 below shows the peak stage profile from the W-14 Canal junction with the Reine Canal to just upstream of the I-10 Bridge.

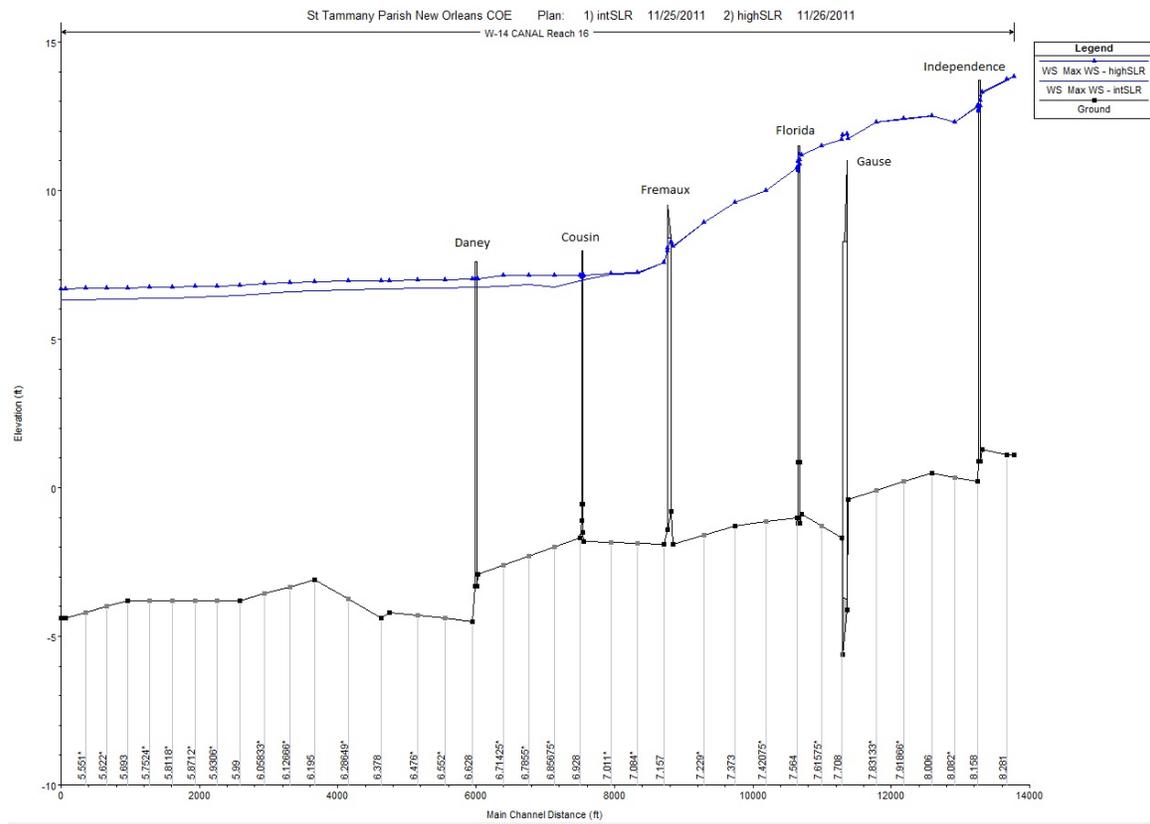


Figure 7. Peak Stage Profile from W-14 Canal Junction with the Reine Canal to Just Upstream of the I-10 Bridge

Economic Reaches

Economic reaches reported in the 2009 533(d) report were delineated using major land features and changes in elevation within the basins, such as streams and major roadways.

The water surface elevation in the W-14 Canal corresponding to the upstream most cross section for each economic reach was reported in 2009 as the maximum water surface elevation within each economic reach. Because the model geometry, basis of the results reported in 2009, lacked a representation of the natural (lateral berms) or manmade features connecting the economic reaches (basins) to the W-14 Canal, the stages estimated in the canal did not correlate closely with the elevations of the economic area infrastructure subject to flooding. For this reason, the PDT decided in September 2010 to reconfigure the model overlaying the economic areas on the basins and connecting these to the W-14 Canal with profiles of the canal natural berms and with subdivision outfall conduits where this information was available. The Economic Reaches are shown in Figure 4 along with the storage areas representing them in the HEC-RAS model.

Tabulated Results

The following tables (Tables 9 through 12) present the results of the HEC-RAS modeling for existing conditions without project and for future with and without project conditions. The results are listed by economic reach, and percent exceedance event for the Recommended Plan only. All water surface elevations are in N.A.V.D. 88 datum. Inducements (post-development stages higher than existing-conditions stages) are shown in bold.

Table 9
Existing Conditions without Project
Flood Event (percent exceedance)

Economic Area	99	50	20	10	4	2	1	0.2
B4	3.6	4.2	5.0	5.3	5.7	6.0	6.3	6.9
B5	9.8	10.0	10.1	10.2	10.2	10.3	10.3	10.4
R1	13.3	13.4	13.4	13.5	13.8	14.0	14.2	14.5
R2	12.9	13.0	13.0	13.1	13.1	13.2	13.2	13.3
R3	11.0	11.8	13.0	13.4	13.7	13.9	14.1	14.4
T1	8.0	8.4	9.2	9.8	10.5	11.0	11.6	12.9
T2	9.6	10.1	11.1	11.7	12.4	12.8	13.2	14.0
T3	12.0	12.4	13.0	13.4	13.8	14.1	14.4	15.2
W0	3.6	3.9	4.3	4.5	4.8	5.1	5.3	5.8
W1	3.7	4.2	4.9	5.5	6.1	6.6	7.2	7.5
W2	5.9	6.2	6.4	6.5	6.6	6.6	6.6	6.9
W3	6.0	6.2	6.4	6.6	6.7	6.8	6.9	7.1
W4	8.9	9.0	9.0	9.1	9.2	9.2	9.3	9.6
W5	8.4	9.6	11.0	11.3	11.6	11.9	12.1	12.4
W7	12.8	12.9	13.1	13.3	13.8	14.0	14.2	14.5
W8	14.7	15.2	15.8	16.2	16.6	16.8	17.1	17.6
W9	14.7	15.2	15.8	16.2	16.6	16.8	17.1	17.6
W10	10.1	10.2	10.5	10.6	10.6	10.7	10.7	10.7
W11	7.2	8.0	9.2	9.6	10.0	10.2	10.3	10.5
W12	12.0	12.5	13.1	13.3	13.7	14.0	14.2	14.5
W13	8.0	8.1	8.2	8.3	8.4	8.5	8.5	8.5

Table 10
Existing Conditions with Project
Flood Event (percent exceedance)

Economic Area	99	50	20	10	4	2	1	0.2
B4	3.6	4.0	4.6	5.1	5.5	5.8	6.1	6.7
B5	9.8	10.0	10.1	10.2	10.2	10.3	10.3	10.4
R1	13.3	13.4	13.4	13.5	13.6	13.8	14.0	14.3
R2	12.9	13.0	13.0	13.1	13.1	13.2	13.2	13.3
R3	11.0	11.8	12.9	13.3	13.7	13.9	14.1	14.3
T1	8.0	8.4	9.2	9.8	10.5	11.0	11.6	12.9
T2	9.6	10.1	11.1	11.7	12.4	12.8	13.2	14.0
T3	12.0	12.4	13.0	13.4	13.8	14.1	14.4	15.1
W0	3.6	3.9	4.3	4.5	4.8	5.1	5.3	5.8
W1	3.7	4.1	4.9	5.5	6.1	6.6	7.1	7.5
W2	5.9	6.2	6.4	6.5	6.6	6.6	6.6	6.7
W3	5.8	6.0	6.3	6.4	6.6	6.7	6.8	7.0
W4	8.9	9.0	9.0	9.1	9.2	9.2	9.3	9.4
W5	8.4	9.2	10.4	11.1	11.4	11.6	11.9	12.2
W7	12.7	12.9	13.1	13.2	13.5	13.8	14.0	14.3
W8	14.7	15.2	15.8	16.1	16.5	16.8	17.1	17.5
W9	14.7	15.2	15.8	16.1	16.5	16.8	17.1	17.5
W10	10.1	10.2	10.3	10.5	10.6	10.6	10.7	10.7
W11	7.1	7.5	8.5	9.3	9.8	10.1	10.3	10.5
W12	11.9	12.3	13.0	13.2	13.4	13.8	14.0	14.3
W13	8.0	8.1	8.2	8.3	8.3	8.5	8.5	8.5

Table 11
 Future Conditions without Project

Flood Event (percent exceedence)

Economic Reach	99	50	20	10	4	2	1	0.2
B4	3.1	3.8	4.5	4.9	5.3	5.6	5.8	6.5
B5	9.3	9.5	9.6	9.7	9.8	9.9	9.9	9.9
R1	12.8	12.9	12.9	13.0	13.3	13.5	13.7	14.0
R2	12.4	12.5	12.5	12.6	12.6	12.7	12.7	12.8
R3	10.5	11.3	12.5	12.9	13.2	13.4	13.6	13.9
T1	7.6	8.0	8.8	9.4	10.1	10.6	11.1	12.5
T2	9.1	9.6	10.6	11.2	11.9	12.3	12.8	13.3
T3	11.5	11.9	12.5	12.9	13.3	13.6	13.9	14.7
W0	3.9	4.1	4.4	4.7	4.9	5.1	5.3	5.9
W1	4.1	4.5	5.2	5.8	6.5	6.8	6.9	7.1
W2	5.4	5.7	5.9	6.0	6.1	6.1	6.1	6.6
W3	5.6	5.7	5.9	6.1	6.2	6.3	6.4	6.6
W4	8.4	8.5	8.6	8.6	8.7	8.7	8.8	9.1
W5	7.9	9.1	10.5	10.9	11.1	11.4	11.6	11.9
W7	12.3	12.4	12.6	12.8	13.3	13.5	13.7	14.0
W8	14.2	14.7	15.3	15.7	16.1	16.3	16.6	17.1
W9	14.2	14.7	15.3	15.7	16.1	16.3	16.6	17.1
W10	9.6	9.7	10.0	10.1	10.1	10.2	10.2	10.2
W11	6.7	7.5	8.7	9.1	9.5	9.7	9.8	10.0
W12	11.5	12.0	12.6	12.8	13.3	13.5	13.7	14.0
W13	7.5	7.6	7.7	7.8	7.8	8.0	8.0	8.0

Table 12
Future Conditions with Recommended Project

Flood Event (percent exceedance)

Economic Reach	99	50	20	10	4	2	1	0.2
B4	3.1	3.6	4.2	4.7	5.1	5.4	5.7	6.3
B5	9.3	9.5	9.6	9.7	9.8	9.8	9.9	9.9
R1	12.8	12.9	12.9	13.0	13.1	13.3	13.5	13.8
R2	12.4	12.5	12.5	12.6	12.6	12.7	12.7	12.8
R3	10.5	11.3	12.5	12.8	13.2	13.4	13.6	13.8
T1	7.6	8.0	8.8	9.4	10.1	10.6	11.1	12.5
T2	9.1	9.6	10.6	11.2	11.9	12.3	12.8	13.3
T3	11.5	11.9	12.5	12.9	13.3	13.6	13.9	14.6
W0	3.9	4.1	4.4	4.7	4.9	5.1	5.3	5.9
W1	4.1	4.5	5.2	5.8	6.4	6.8	6.9	7.1
W2	5.4	5.7	5.9	6.0	6.1	6.1	6.1	6.3
W3	5.3	5.6	5.9	5.9	6.1	6.2	6.3	6.5
W4	8.4	8.5	8.6	8.6	8.7	8.7	8.8	8.9
W5	7.9	8.7	9.9	10.6	10.9	11.1	11.4	11.7
W7	12.2	12.4	12.6	12.7	13.0	13.3	13.5	13.8
W8	14.2	14.7	15.3	15.6	16.0	16.3	16.6	17.0
W9	14.2	14.7	15.3	15.6	16.0	16.3	16.6	17.0
W10	9.6	9.7	10.0	10.0	10.1	10.1	10.2	10.2
W11	6.6	7.1	8.0	8.7	9.3	9.6	9.8	10.0
W12	11.4	11.9	12.6	12.7	12.9	13.3	13.5	13.8
W13	7.5	7.6	7.7	7.8	7.8	8.0	8.0	8.0

RISK AND UNCERTAINTY

Introduction

This section addresses the hydrologic engineering portion of the risk and uncertainty analysis of the Southeast Louisiana Urban Flood Control Project, W-14 Canal Improvements Section 533(D) Report, as required under ER 1105-2-100 and ER 1105-2-101. Also, the risk-based analysis performed follows the guidelines of EM 1110-2-1619.

The objective of this interdisciplinary approach is to conduct a probabilistic analysis of all key variables, parameters, and components of flood damage reduction studies. Key economic variables in an urban situation normally include depth-damage curves, structure values, content values, structure first-floor elevations, structure types, flood

warning times, and flood evacuation effectiveness. Furthermore, the hydrologic and hydraulic variables such as discharge and stage are included in the analysis.

Methodology

The Hydrologic Engineering Center Flood Damage Analysis (HEC-FDA) numerical model developed by the US Army Corps of Engineers' Hydrologic Engineering Center was used to perform the analysis. The HEC-FDA model provides the capability to perform an integrated hydrologic engineering and economic analysis during the formulation and evaluation of flood damage reduction plans. The model includes risk analysis methods to quantify uncertainty in discharge-exceedance probability, stage-discharge, and stage-damage functions and incorporate it into the economic and engineering performance analysis of alternatives. The program applies Monte Carlo simulation, a numerical analysis procedure that computes the expected value of damage while explicitly accounting for the uncertainty in the basic value to perform the computations. The individual plan evaluation is accomplished with the simulation's output reports.

Sufficient or appropriate stage gage observations are ideal to develop the frequency curves. Since these data is not available in this study area, rainfall-runoff analysis is used to develop a synthetic frequency curve. The synthetic frequency curve or graphical stage- probability function was determined by using the Graphical Exceedance Probability Method. However, this method requires an estimate of the equivalent years of record. The equivalent years of record was estimated using the guidelines established in ETL 1110-2-537, "Engineering and Design Uncertainty Estimates for Non-analytical Frequency Curves", 31 October 1997. In addition, the magnitude of uncertainty related to the graphical stage-probability function is estimated with the order statistics methodology.

Application

The synthetic rainfall data used to develop the hydrologic and hydraulic analysis was obtained from the Southern Regional Climate Center (SRCC) Technical Report 97-1 and National Oceanographic and Atmospheric Administration Technical Memorandum NWS HYDRO-35. The SRCC Report is considered as an update to the NWS TP-40 document and the network of rainfall stations used in the SRCC Report includes at least one station in the Slidell Metropolitan Area. The period of record analyzed for the SRCC Report includes the May, 1995 event which caused extensive flooding in Slidell.

The synthetic rainfall period of record was used to determine the equivalent record length of 50 years. The synthetic stage-frequency coordinates for each sub-area within the basin

were input to develop its stage-probability function and confidence limits. The graphs illustrating the stage-probability function with confidence limits for these economic reaches are shown in Figure 8 through Figure 28.

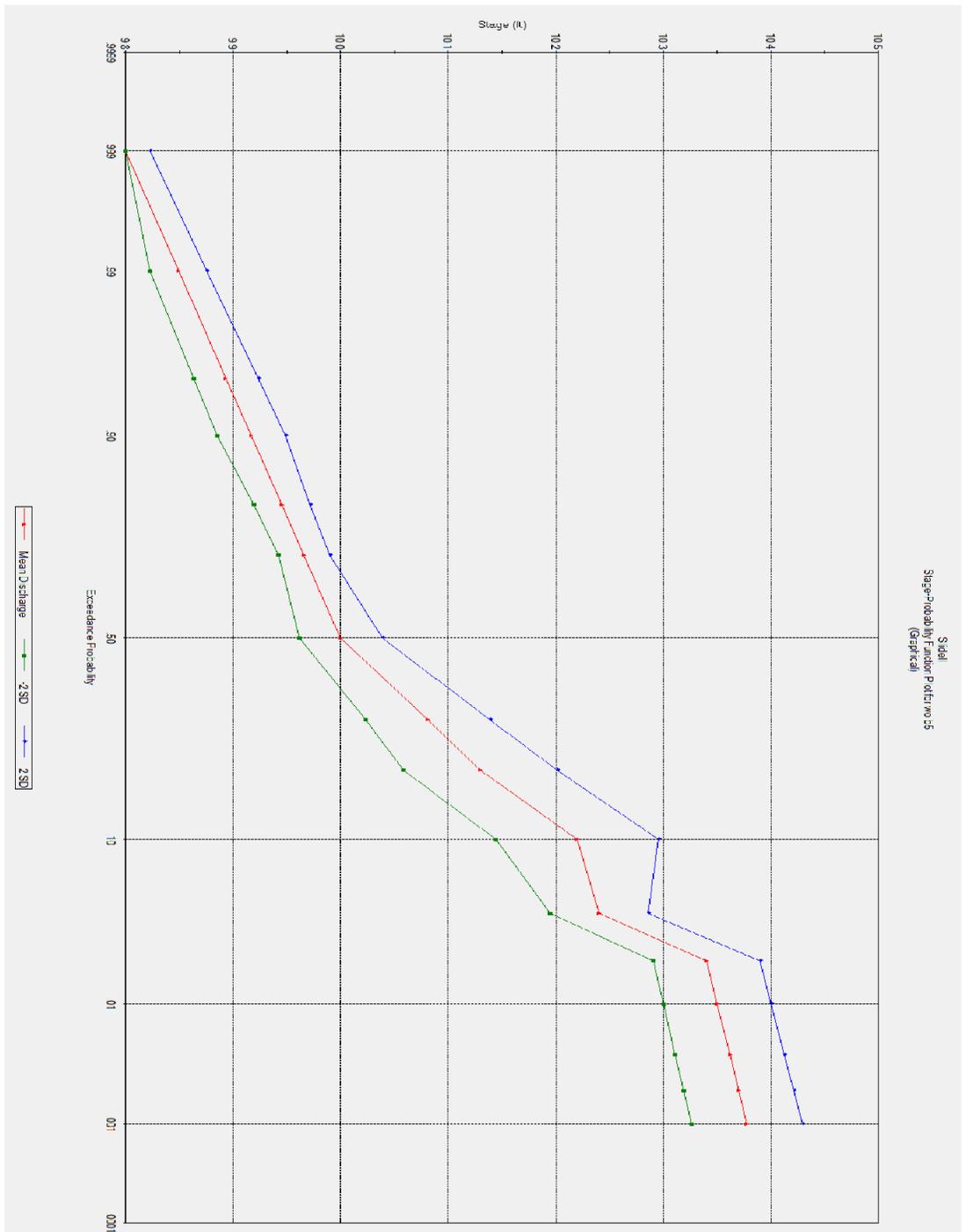


Figure 9. Stage-Probability Function Plot, Reach B5

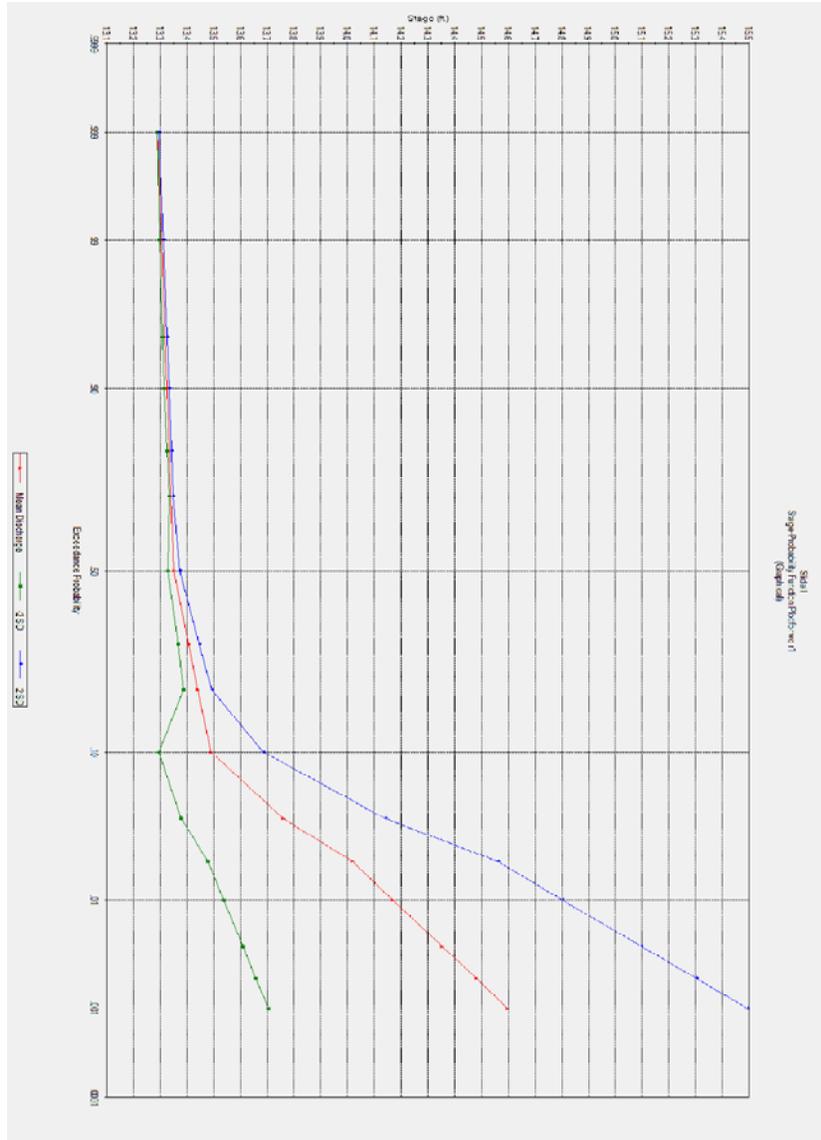


Figure 10. Stage Probability Function Plot, Reach R1

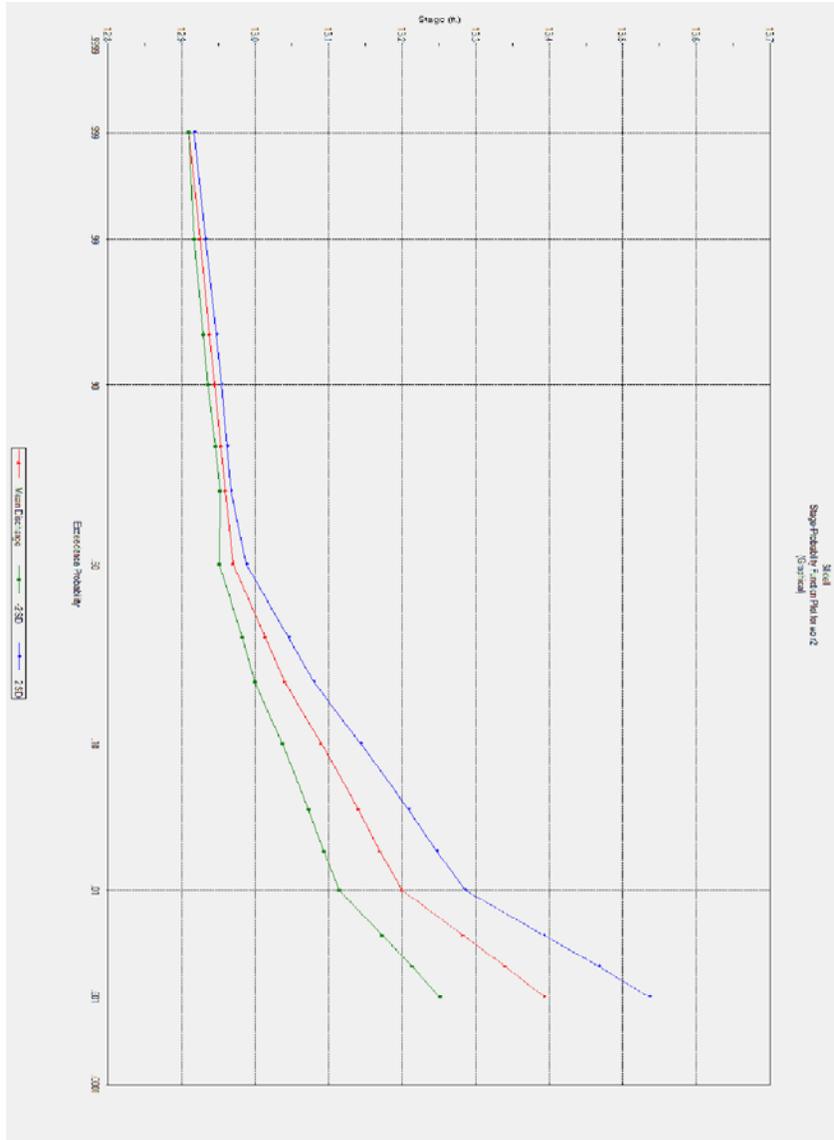


Figure 11. Stage-Probability Function Plot, Reach R2

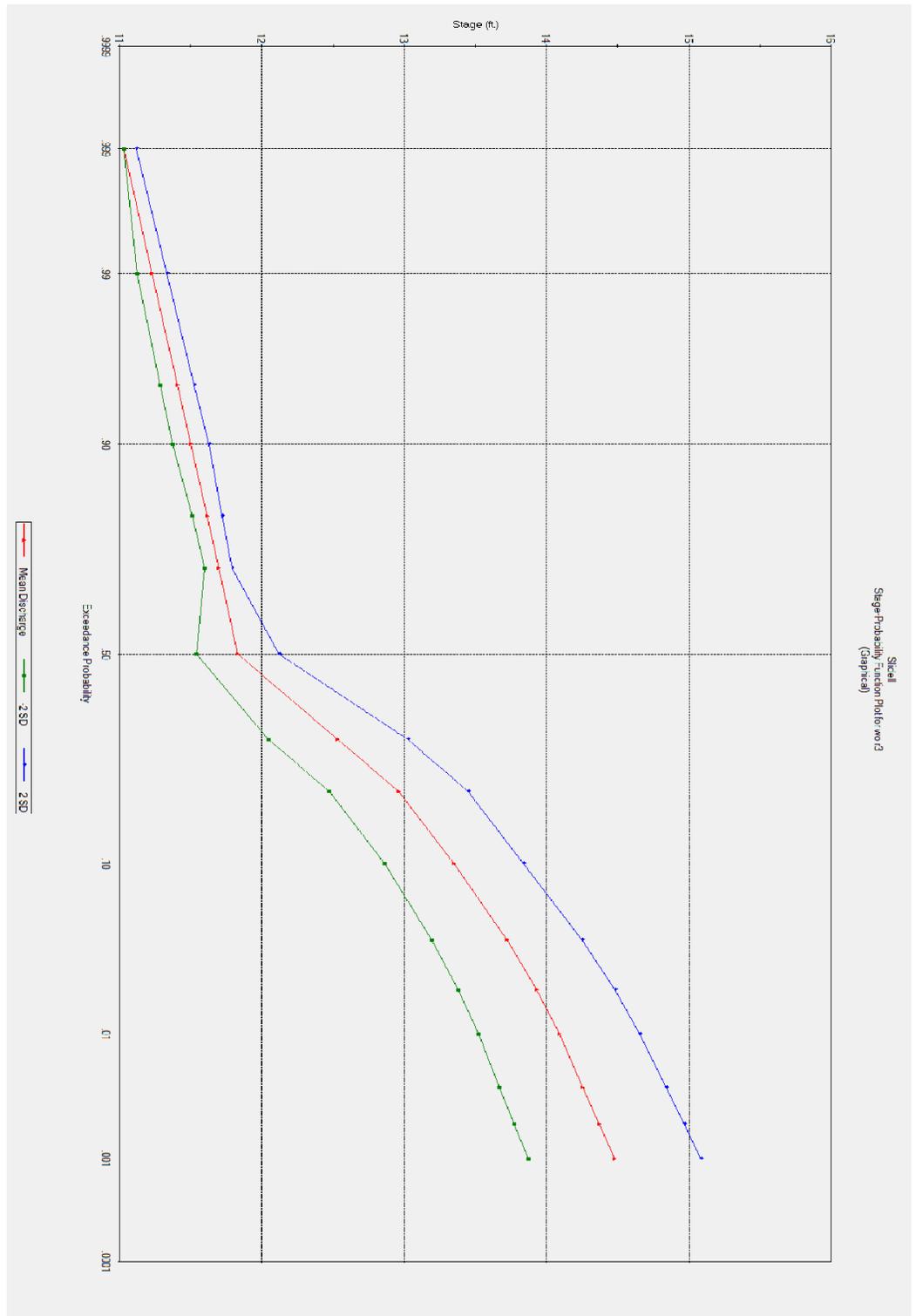


Figure 12. Stage-Probability Function Plot, Reach R3

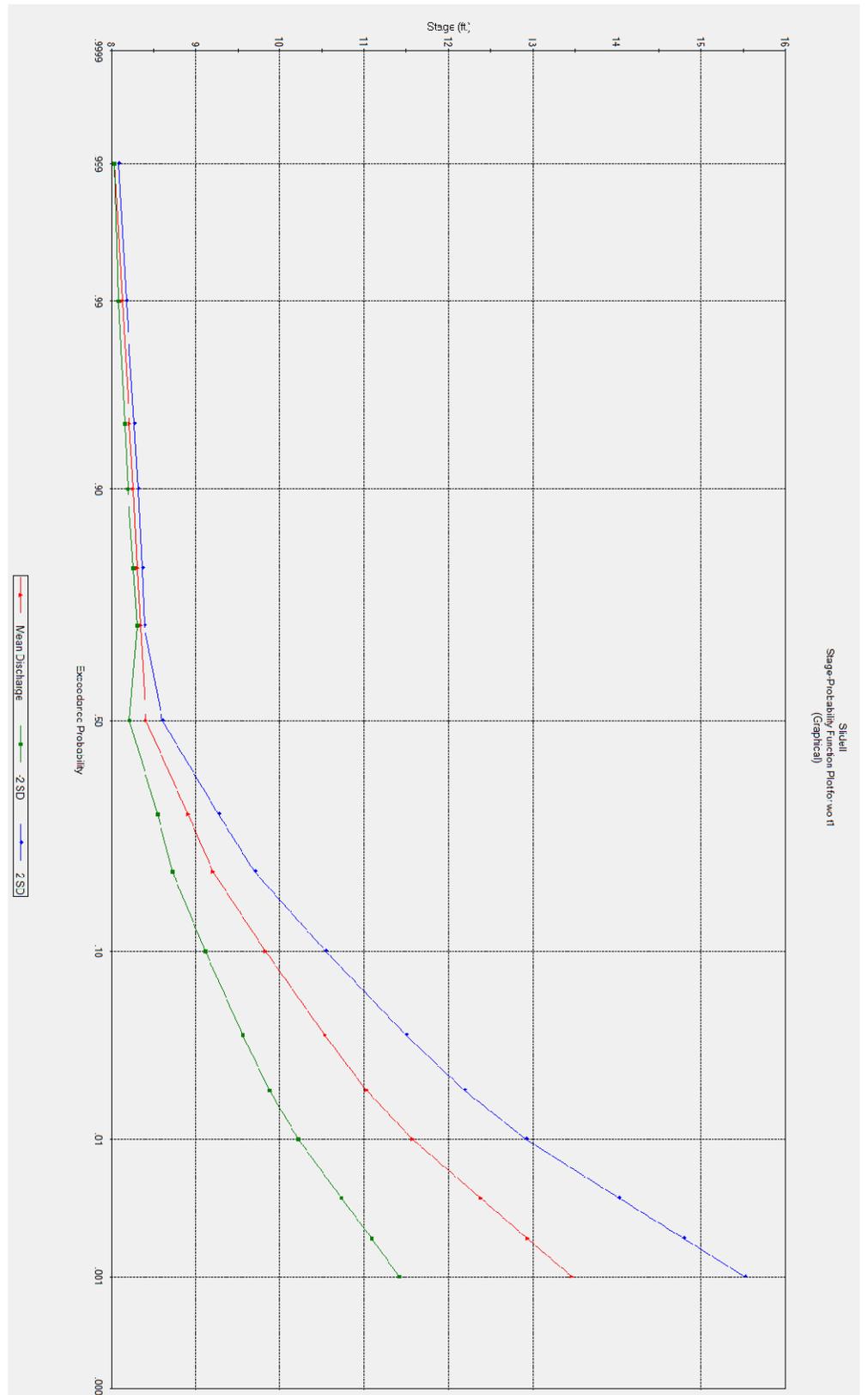


Figure 13. Stage-Probability Function Plot, Reach T1

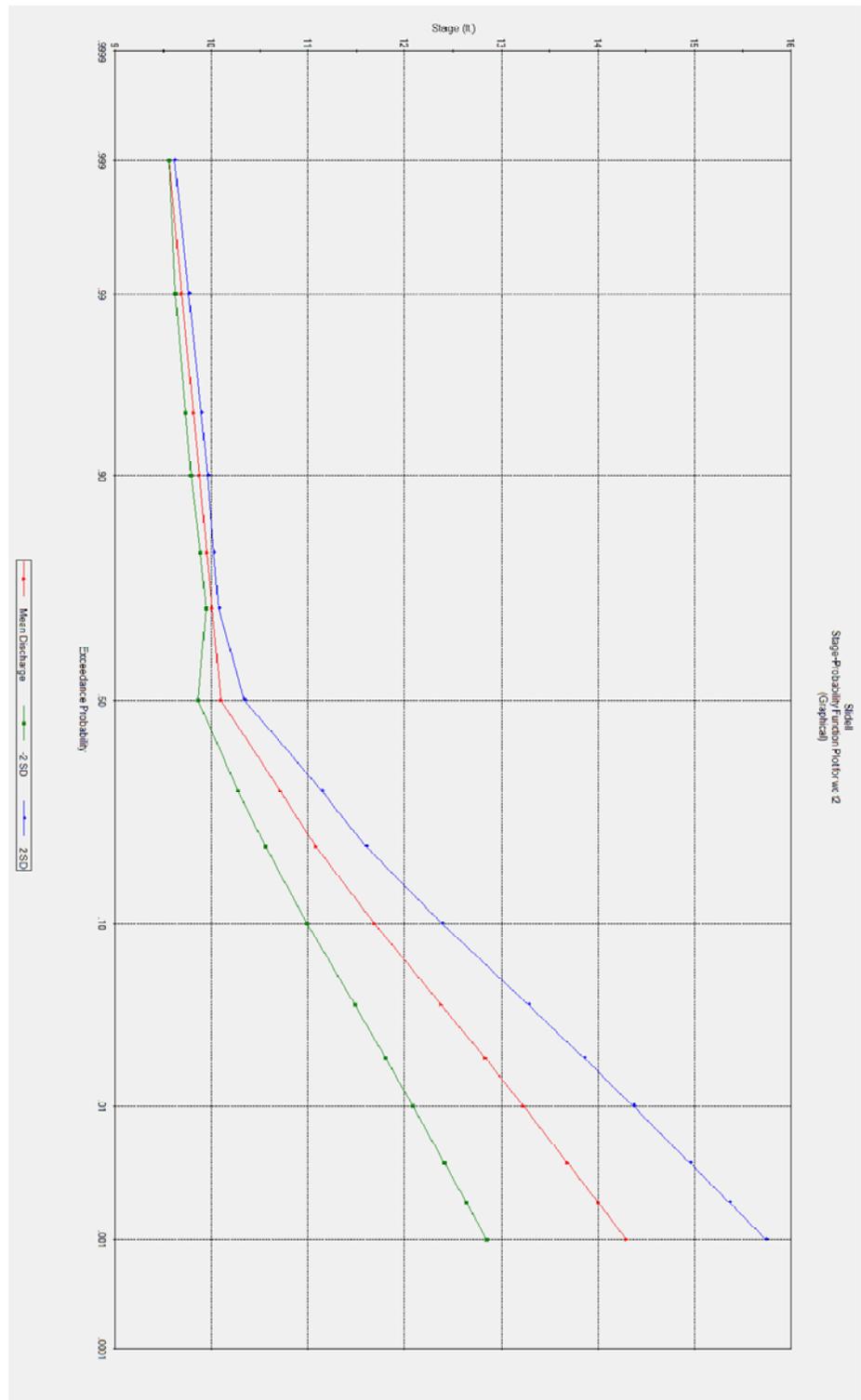


Figure 14. Stage-Probability Function Plot, Reach T2

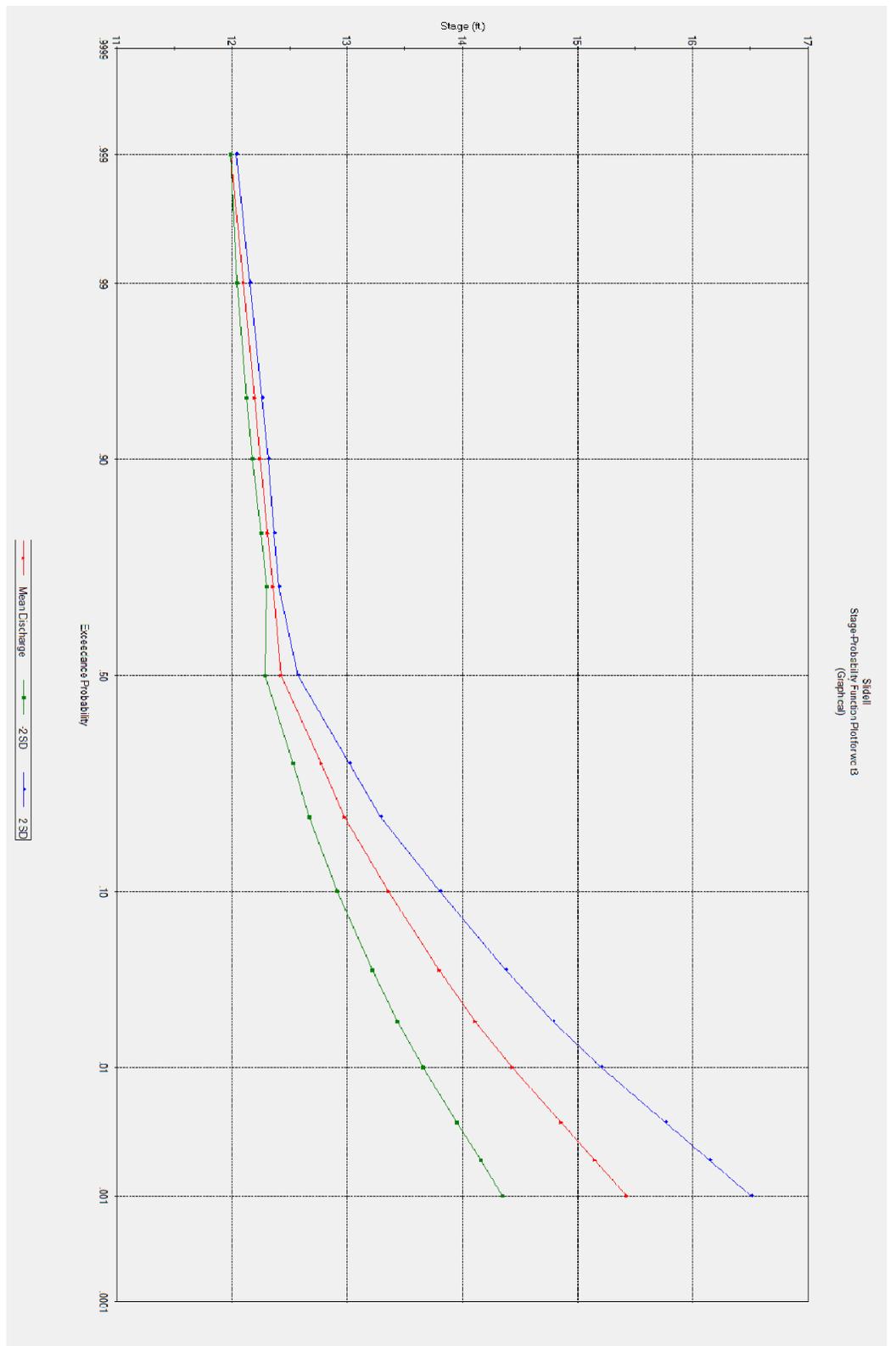


Figure 15. Stage-Probability Function Plot, Reach T3

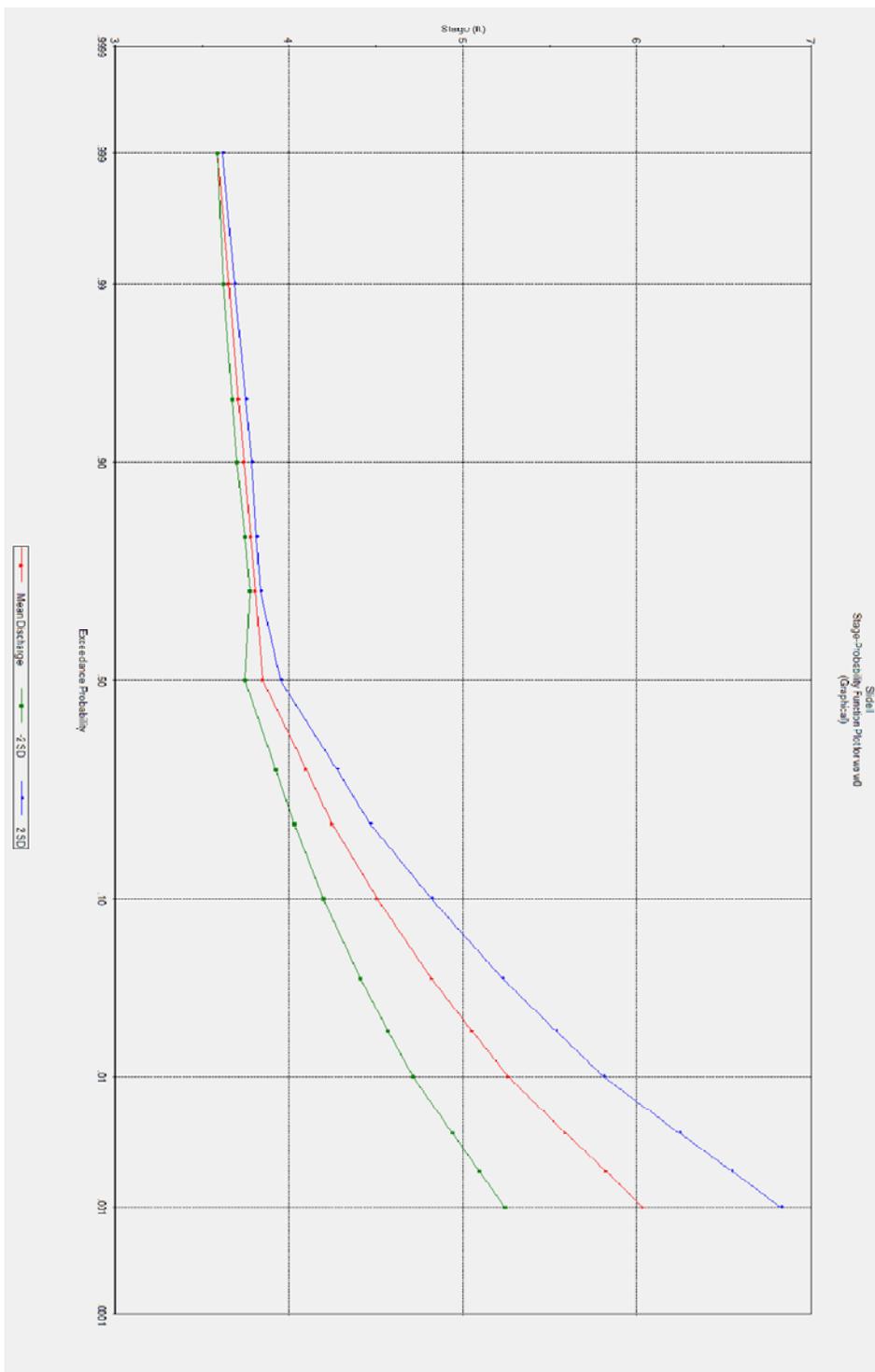


Figure 16. Stage-Probability Function Plot, Reach W0

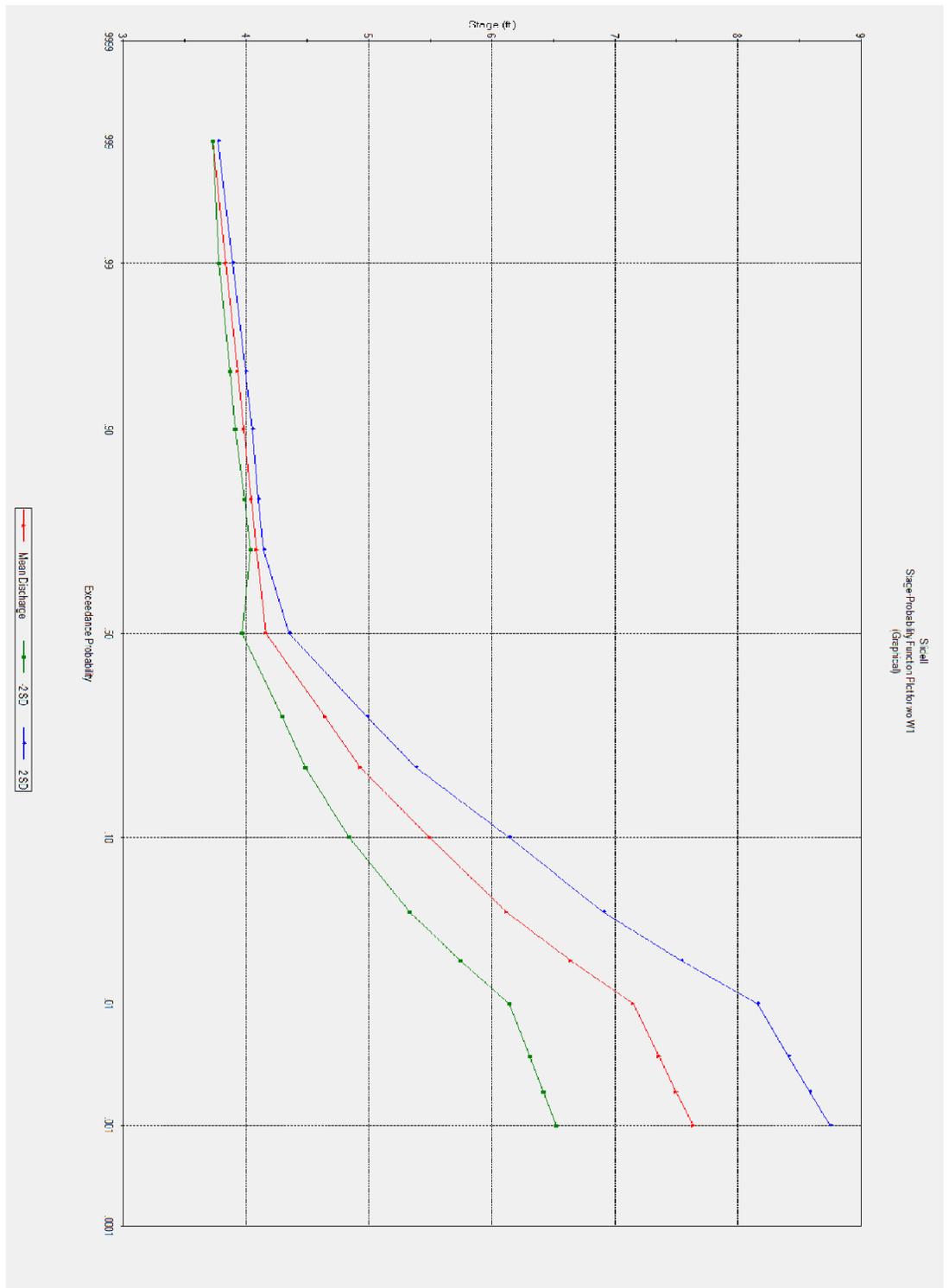


Figure 17. Stage-Probability Function Plot, Reach W1

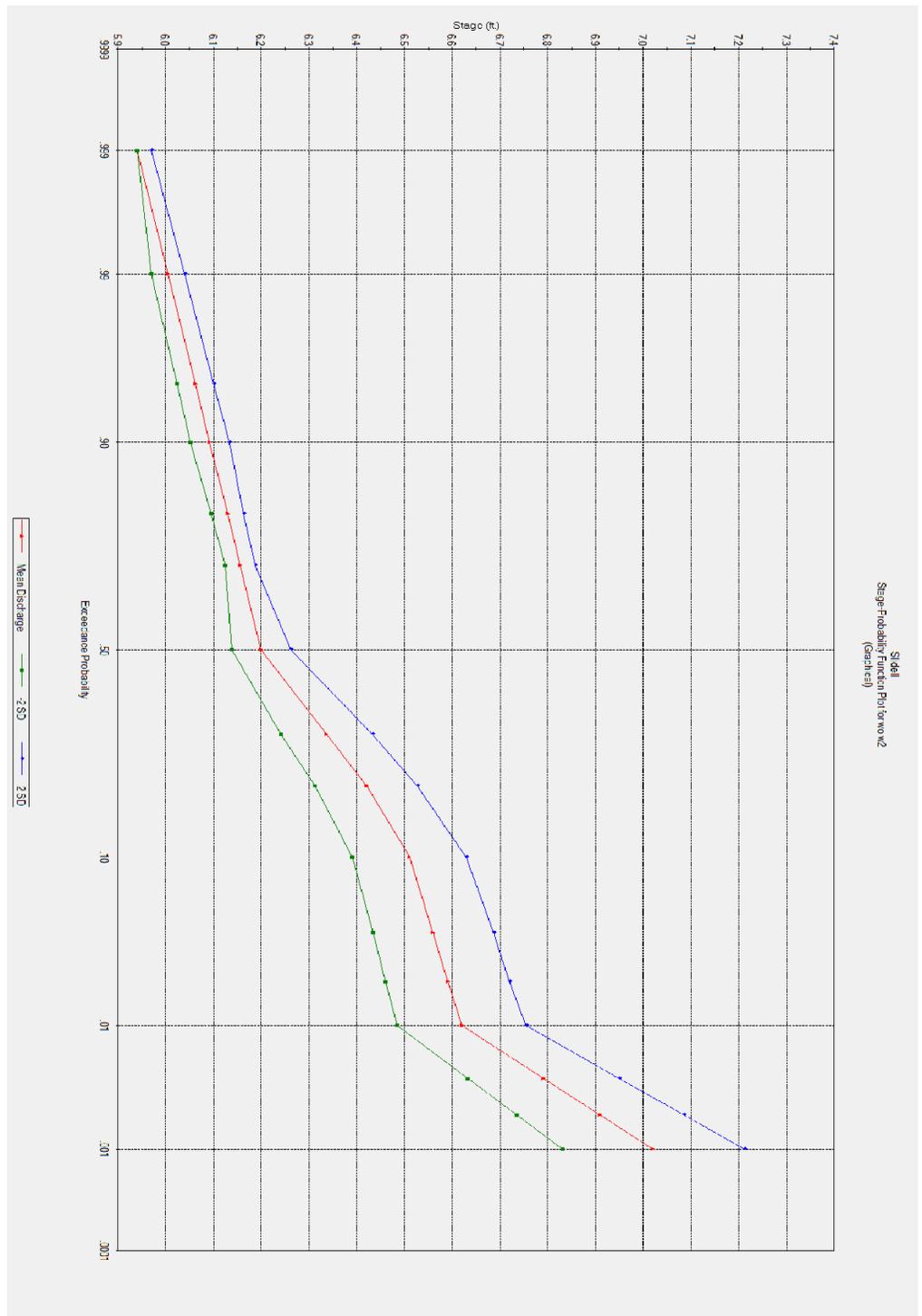


Figure 18. Stage-Probability Function-Plot, Reach W2

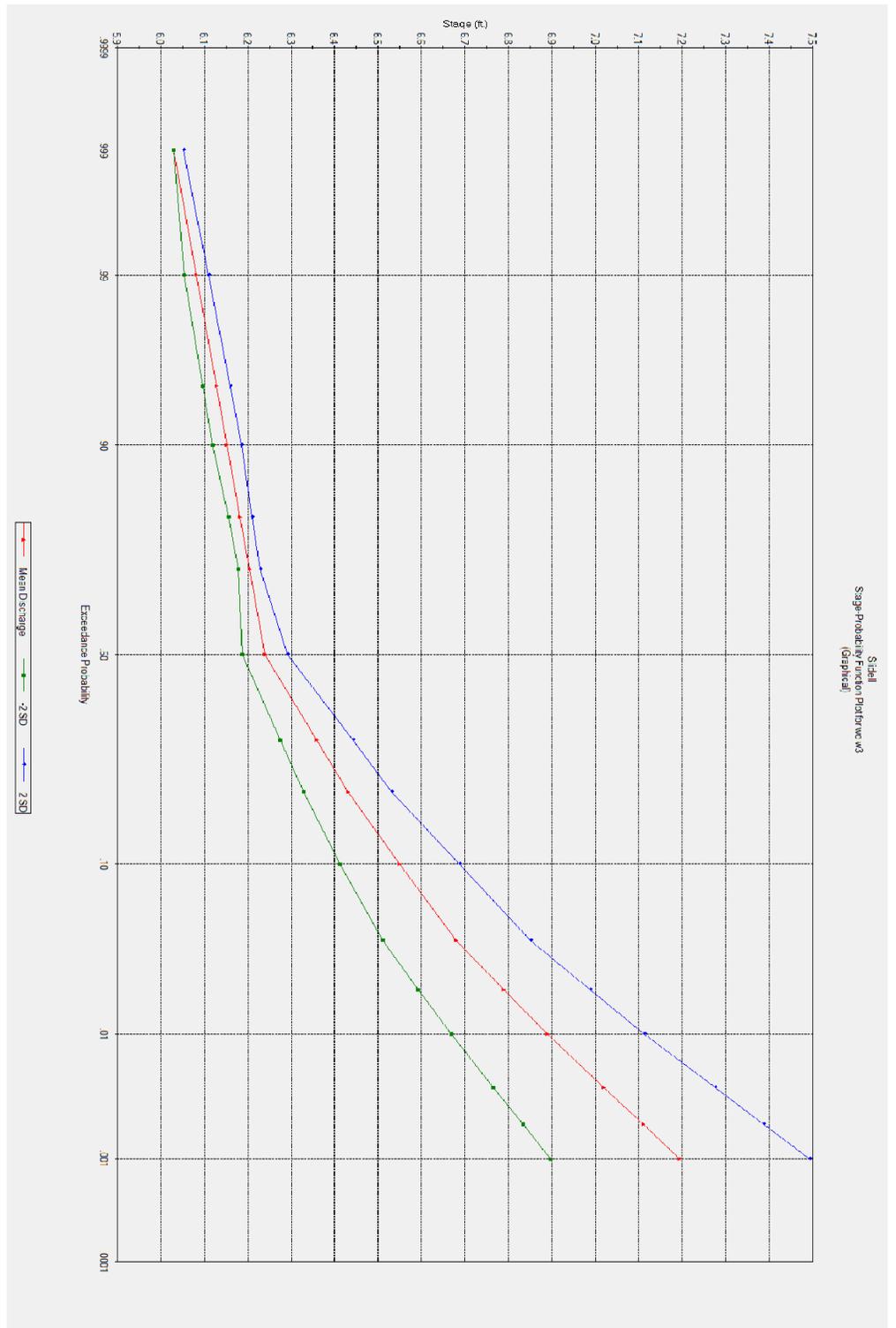


Figure 19. Stage-Probability Function Plot, Reach W3

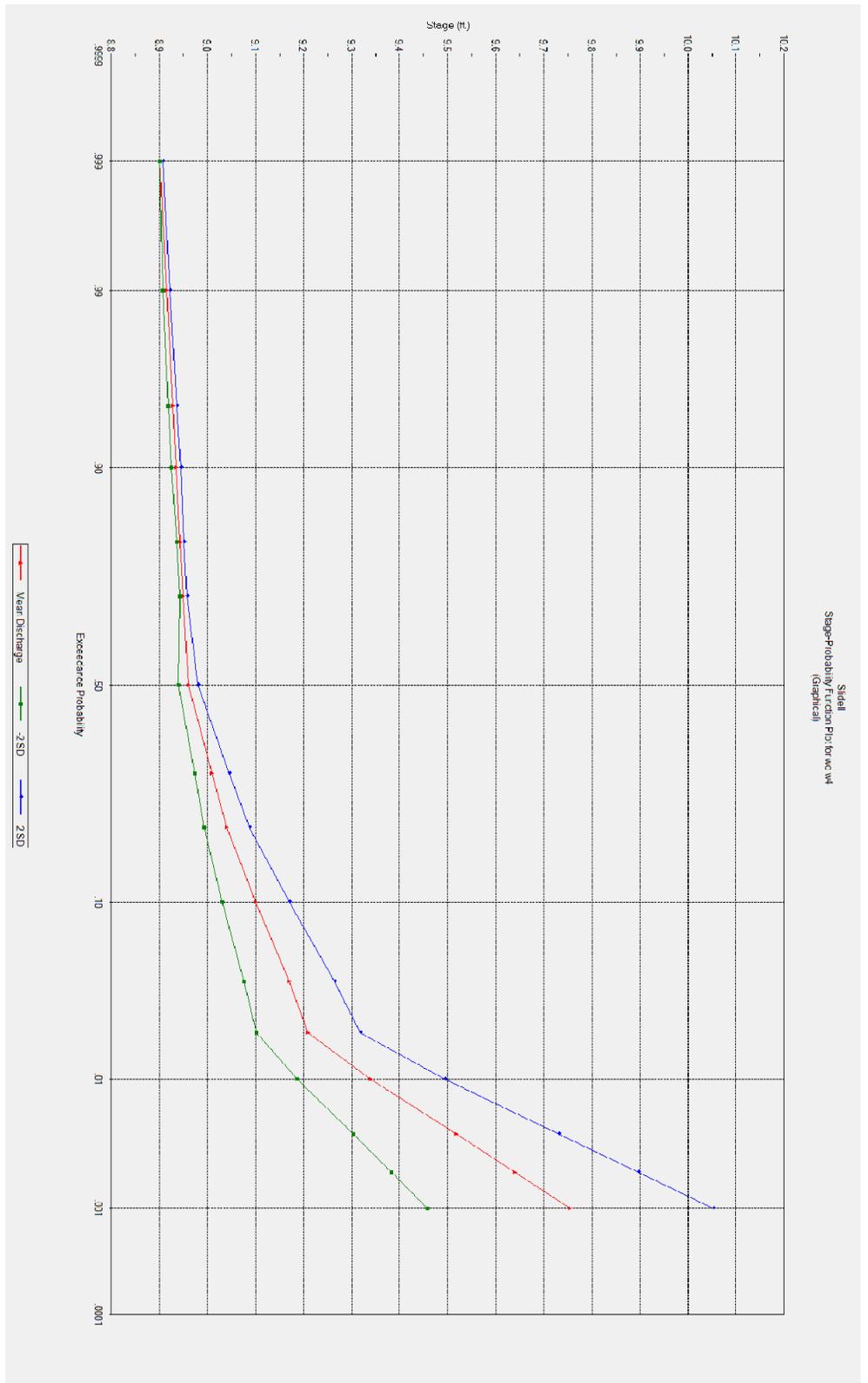


Figure 20. Stage-Probability Function Plot, Reach W4

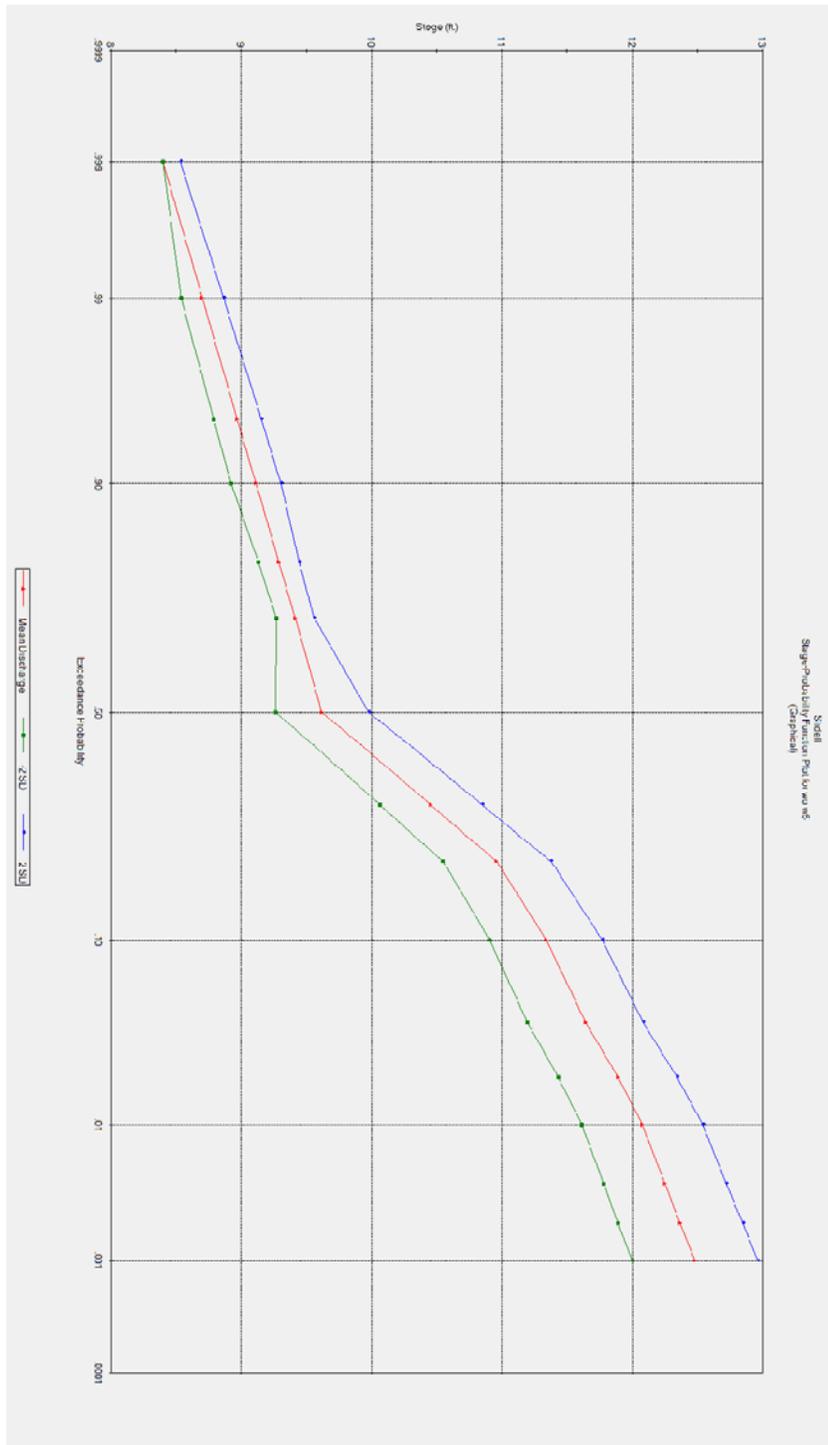


Figure 21. Stage-Probability Function Plot, Reach W5

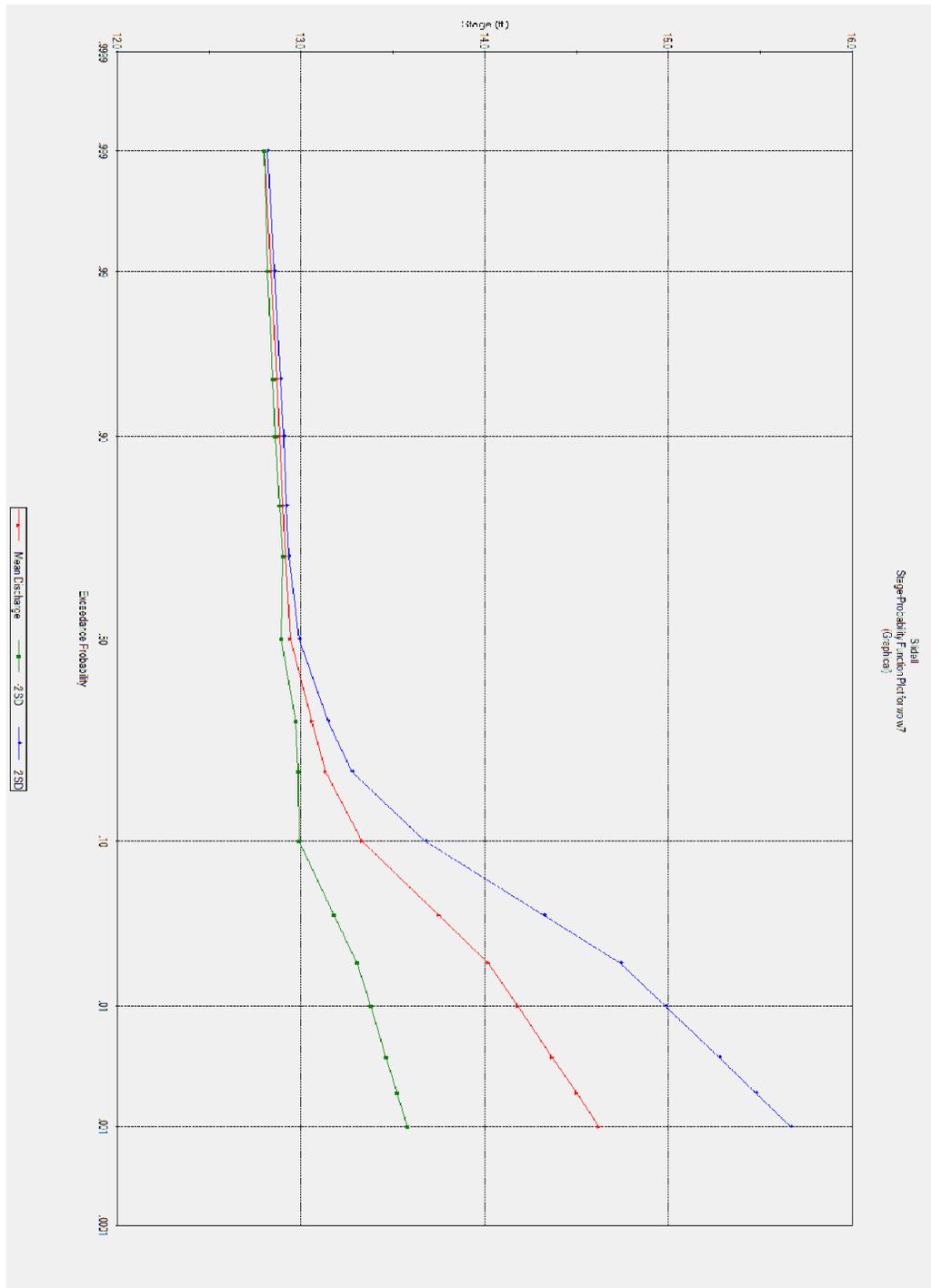


Figure 22. Stage-Probability Function Plot, Reach W7

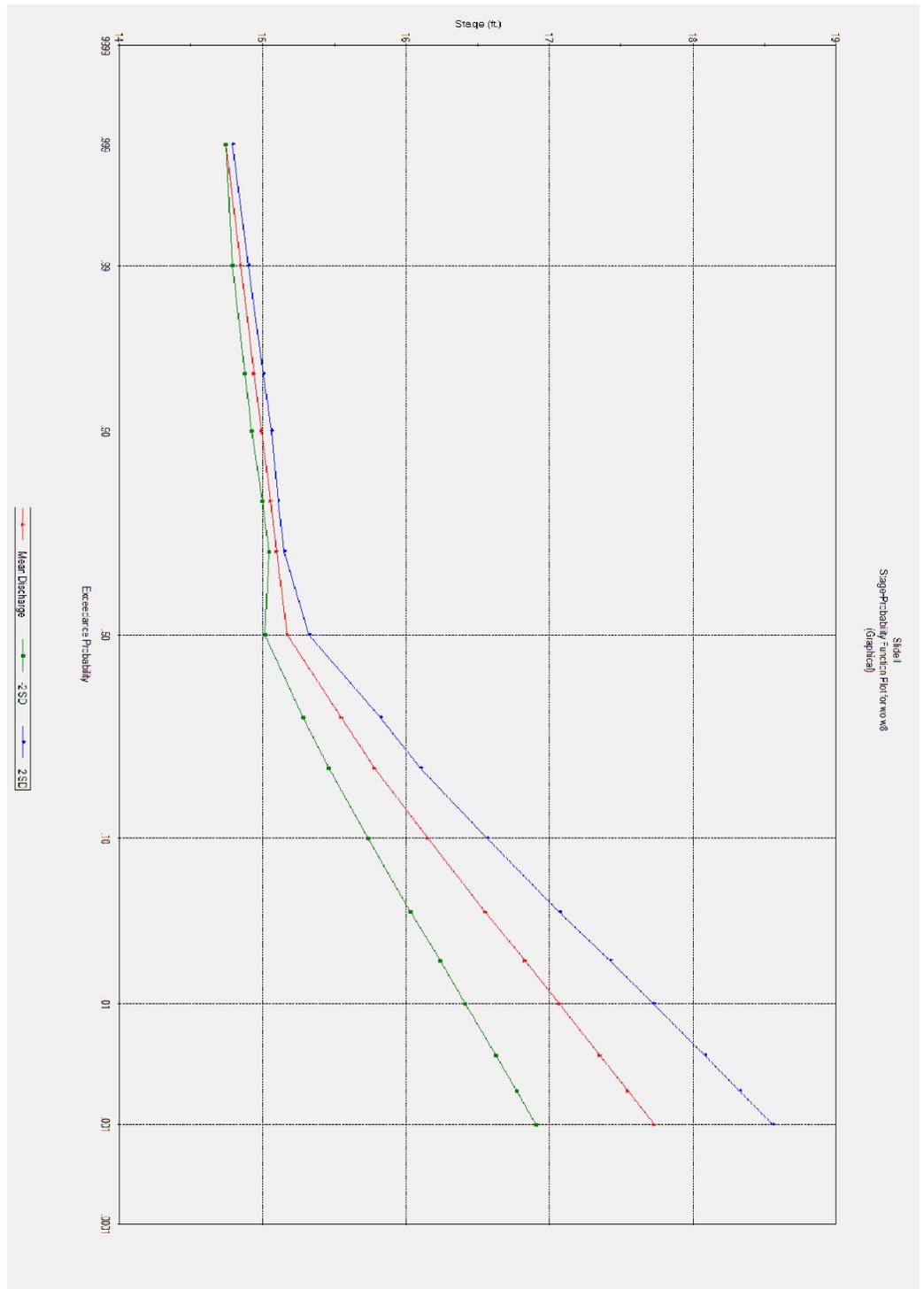


Figure 23. Stage-Probability Function Plot, Reach W8

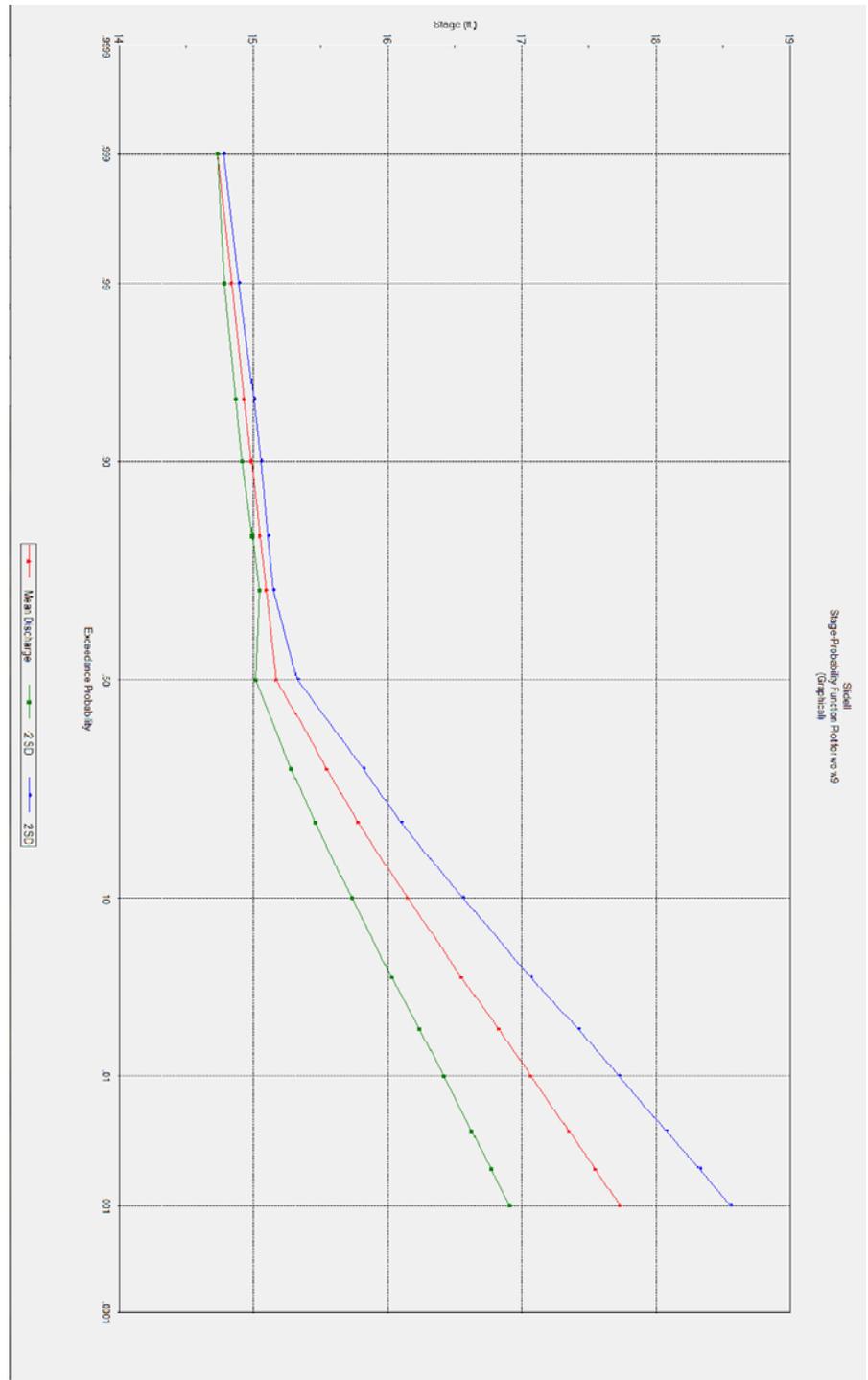


Figure 24. Stage-Probability Function Plot, Reach W9

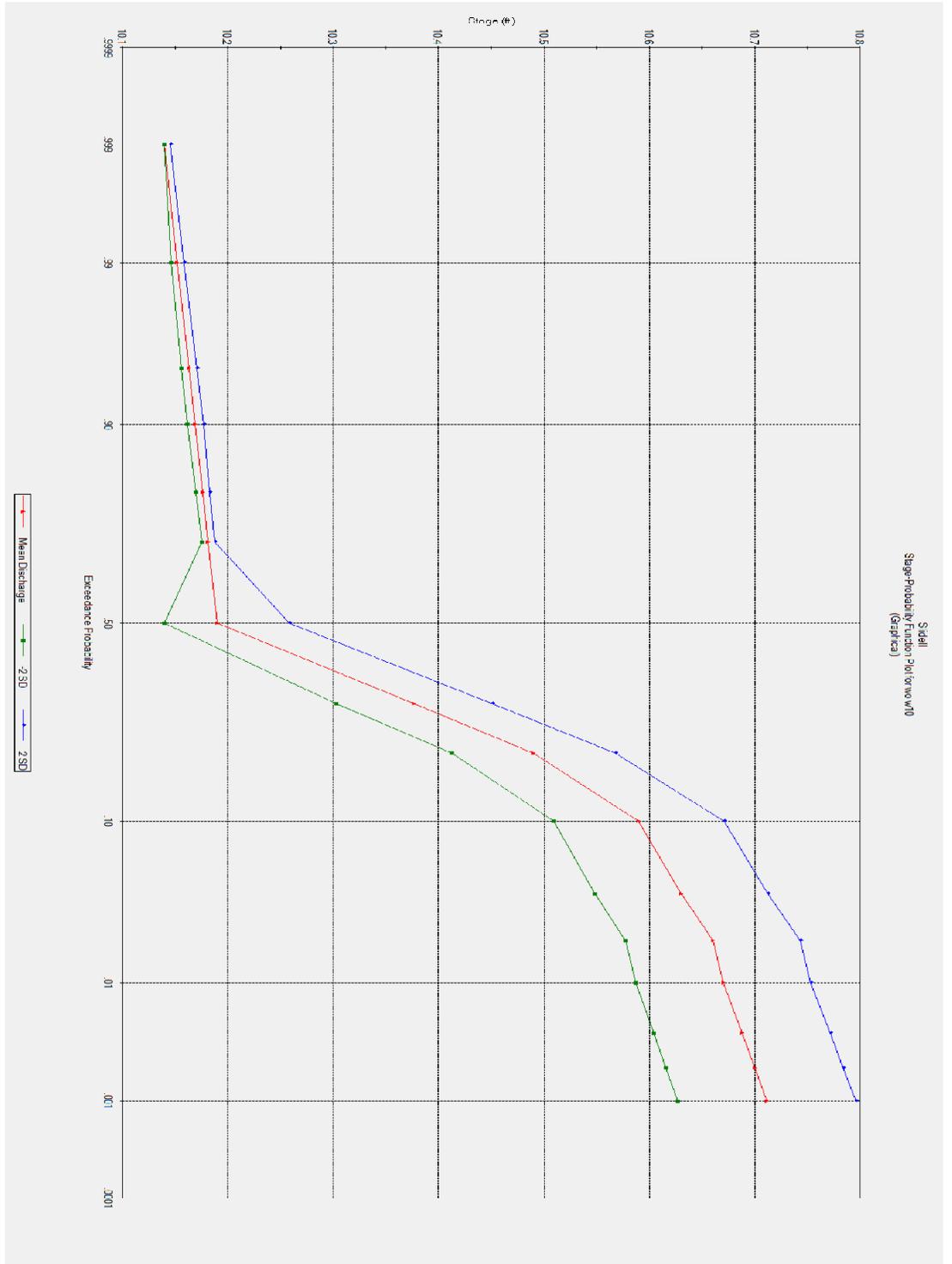


Figure 25. Stage-Probability Function Plot, Reach W10

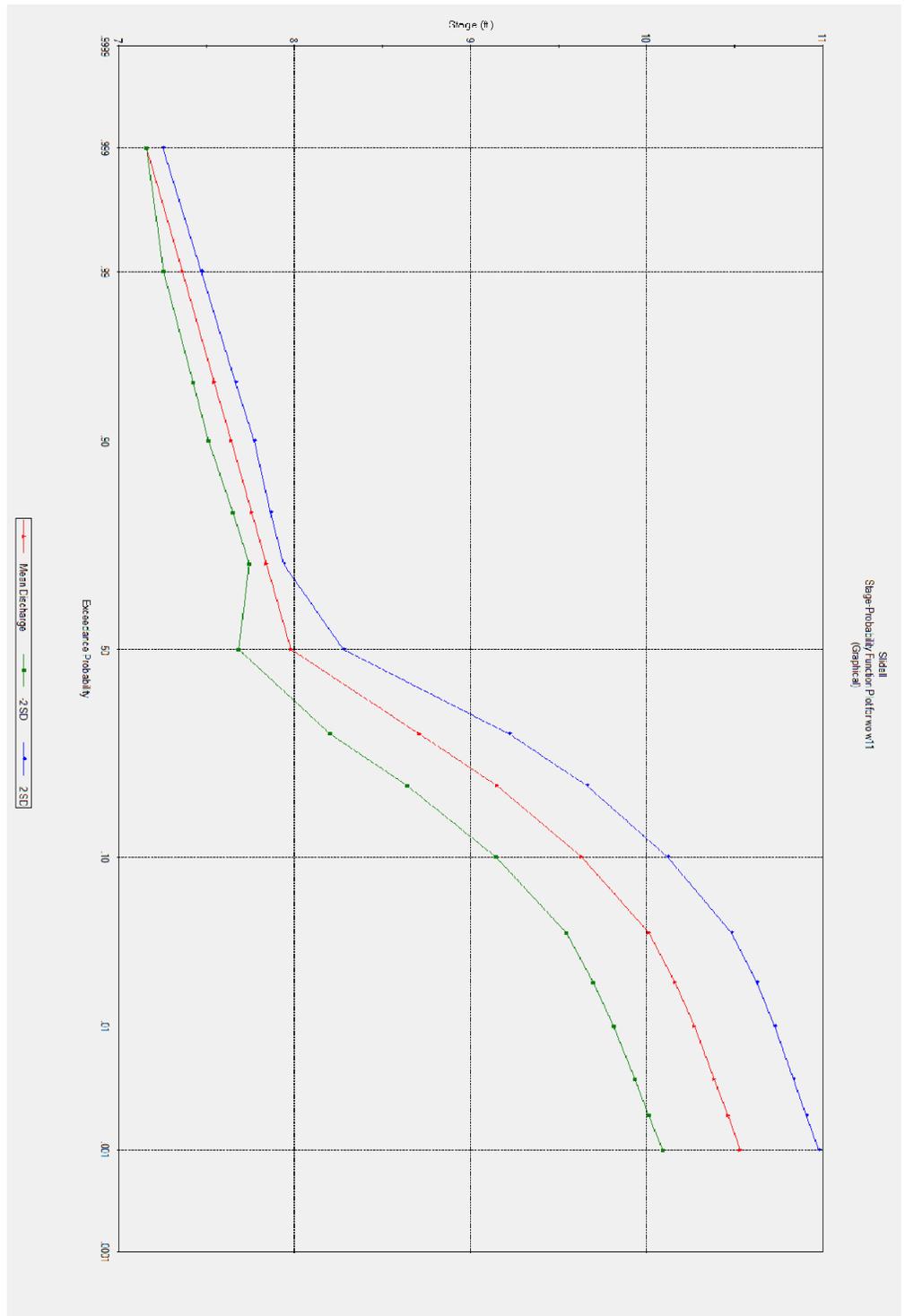


Figure 26. Stage-Probability Function Plot, Reach W11

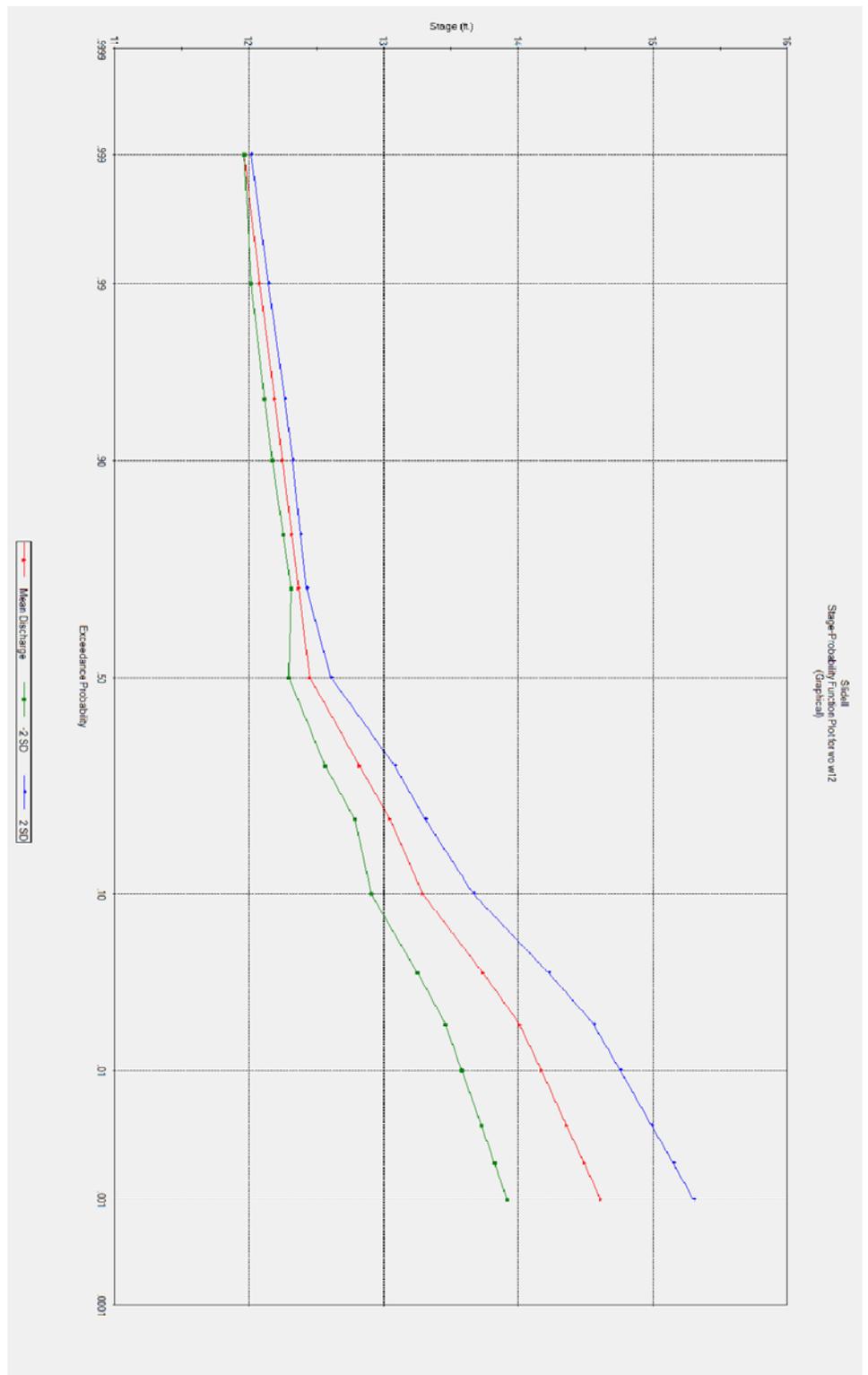


Figure 27. Stage-Probability Function, Reach W12

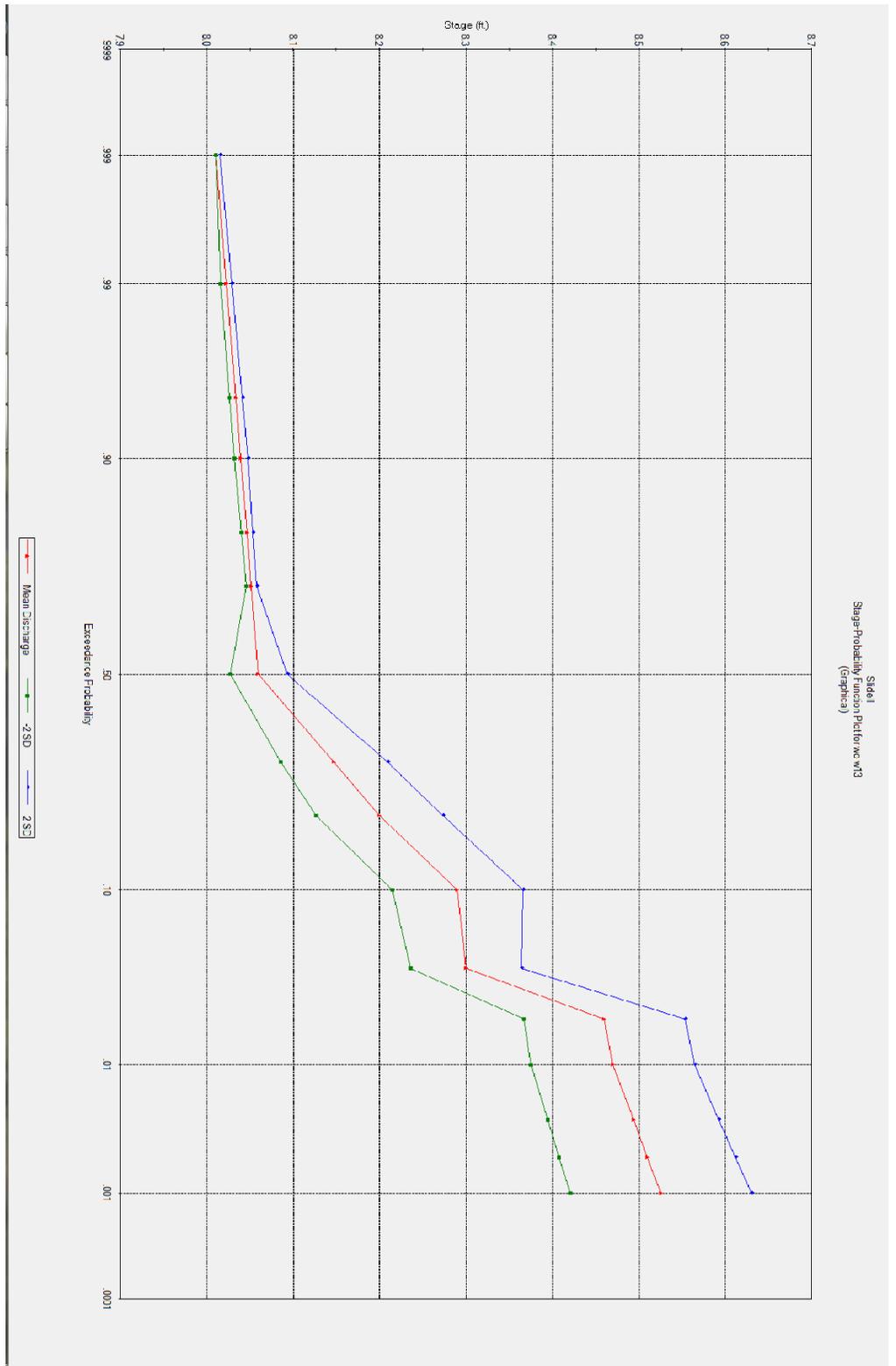


Figure 28. Stage-Probability Function Plot, Reach W13

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WATER QUALITY

GENERAL

This Water Quality Assessment (WQA) considers the applicable standards and criteria used to assess existing water quality in the area. It also describes existing water quality and identifies the potential water quality impacts associated with the proposed Slidell, LA W-14 Canal Improvements Project.

WATER QUALITY STANDARDS AND CRITERIA

United States Environmental Protection Agency (USEPA) – Ecological Condition of Estuaries and Wetlands in Louisiana

As part of a year 2000 assessment of water quality, a study of 51 State of Louisiana's estuary sub-segments was conducted by the United States Environmental Protection Agency, totaling about 4,947 square miles. Of those estuaries surveyed, 33.2% fully supported designated uses, 6.2% were fully supported but threatened, 36.3% were partially supported, 5.8% were not supported and 18.4% did not have sufficient data. Impaired use of the estuaries was most often due to metals and mercury. The next common source of impairment includes pathogen indicators and nutrients.

Only 1,613 square miles of wetlands are assessed by the Louisiana Department of Environmental Quality (LDEQ). Of these, 52.4% are rated as fully supporting designated conditions, 19.5% were rated as partially supporting, and 28.1% were considered INSD. Impairment to the wetlands was attributed to mercury mostly, and small amounts of

cadmium, copper and lead. Atmospheric deposition accounted for some impairment, but for a large area, the source is unknown.

As part of this same assessment, an ecological report card was prepared for each state with estuaries along the Gulf of Mexico coast. Louisiana’s report card is shown in Table 13. Each priority ecological indicator will be explained in more detail in the following paragraphs.

Table 13
Louisiana’s Ecological Report Card

PRIORITY ECOLOGICAL INDICATOR	PERCENT OF AREA AFFECTED BY ADVERSE CONDITIONS
Nutrients	25-35
Dissolved Oxygen	10-25
Sediment Contaminants	10-25
Wetlands	>35
Benthos	10-25
Fish/Shellfish Landings	5-10
Fish Biomarkers	5-10
Coastal and Marine Birds	0-5
Threatened Species	10-25
Shellfish Closures	25-35
Fish Tissue Contaminants	10-25

Nutrients are an indicator of eutrophication potential of coastal estuaries. Nutrients are added to the natural system by runoff of fertilized agricultural fields, animal wastes, and from the atmosphere. Data indicates that approximately 25 to 35 percent of Louisiana estuaries suffer from nutrient enrichment.

Dissolved oxygen (DO) is an indicator of eutrophication as well. Low DO may be due to stratification, metabolism, seasonal storm events, and depth/tide regimes. Depleted DO can also be due to nutrient enrichment, habitat modification, and channelization.

Areas of concern for sediment contamination were identified by using the Effects Range – Low (ER-L) and Effect Range - Median (ER-M) sediment quality benchmarks developed by the National Oceanic and Atmospheric Administration (NOAA). In Louisiana, between 10 and 25 percent of estuarine areas were affected by adverse levels of sediment contamination. The few areas identified were generally localized to shipping channels and to point sources.

The wetland category indicates wetland loss. Louisiana lost 41 percent of its total wetlands from 1780 through 1980. Losses in the range of 20 to 100 percent in sea grass beds have occurred along the Gulf of Mexico coast. Wetland losses continue to occur, although they have slowed in the 1990's across Louisiana (from 42 square miles per year in the 1970's to 25 square miles per year in the 1990's). In Louisiana, these losses are caused by commercial and residential development and by hydrologic alterations.

For the purpose of this survey, Benthos refers to the comparison of Benthic communities to known degraded communities and known reference communities. In Louisiana's estuaries between 10 and 25 percent of these communities were found to be degraded.

The indicator "fish/shellfish landings" refers to the trend in landings of fish and shellfish. Landings have been generally stable with a decline in the shrimp harvest in Louisiana. This decline may be due to degraded water quality or due to wetland loss.

Fish Biomarkers refer to health assessments made by examining fish for pathological disorders and macrophage aggregate attachments. Most observed abnormalities were parasites in menhaden. Abnormalities are generally confined to particular estuaries. In Louisiana, between 5 and 10 percent of estuaries were identified as having fish with these abnormalities. These abnormalities are often due to environmental contamination.

Coastal and Marine birds use the Gulf of Mexico estuaries and wetlands as vital habitat. These areas provide habitat for both resident and wintering birds. These estuaries and wetlands support large, health and stable population of waterfowl and other birds.

Threatened species inhabiting the Gulf of Mexico estuaries almost exclusively include Manatees, Brown Pelicans, the Gulf Sturgeon, and Kemps Ridley sea turtles. While Manatees are found mainly in Florida, the other threatened and endangered species are found off the coast of Louisiana. Of these, only the Kemps Ridley sea turtle are apparently in decline.

The "Shellfish Closures" category refers to the percentage of waters classified as shellfish producing waters that were closed to harvesting between 1985 and 1995. The largest percentage of waters closed is due to shellfish closures. In Louisiana, between 25 and 35 percent of shellfish producing waters were closed to harvesting during this period.

The last category rated in this survey was "Fish Tissue Contaminants". This rating was based on the testing of the edible portion of fish and comparing contaminant levels to Environmental Protection Agency (EPA) consumption guidelines. Between 10 and 25

percent of the samples taken in Louisiana's coastal and estuarine waters were contaminated.

In conclusion, most indicators showed that Louisiana's Gulf estuaries were in fair condition. This survey indicated that Louisiana's estuaries experienced problems related to nutrient, fish tissue contaminants, wetland loss, and shellfish bed closures. Louisiana, as well as the other Gulf of Mexico states, showed minimal problems with fish and bird populations.

LDEQ – Water Quality Inventory

In addition to this USEPA survey, the Louisiana Department of Environmental Quality (LDEQ) prepares a bi-annual water quality inventory of all waters of the State of Louisiana. A summary of the relevant portions of this inventory is included below.

Water Use Designations

LDEQ has established seven water use designations for surface waters in the state. The seven designated water uses are:

- Primary Contact Recreation
- Secondary Contact Recreation
- Fish and Wildlife Propagation
- Outstanding Natural Resource
- Drinking Water Supply
- Shell Fish Propagation
- Agriculture

Specifically, LDEQ has designated the waters of the Slidell, Louisiana to the Gulf of Mexico Study area according to the following uses:

- Primary Contact Recreation
- Secondary Contact Recreation
- Fish and Wildlife Propagation
- Outstanding Natural Resource
- Drinking Water Supply
- Shell Fish Propagation
- Agriculture

For the primary contact recreation designation, a waterbody should be suitable for activities such as swimming, water skiing, and skin diving. A waterbody designated for

Secondary Contact Recreation should be suitable for activities such as boating, fishing, and limited contact incident to shoreline activities. The fish and wildlife propagation designation means the waterbody should also be suitable for preservation and reproduction of aquatic biota such as indigenous species of fish, invertebrates, reptiles, amphibians, and other wildlife associated with the aquatic environment. The outstanding natural resource designation indicates that a waterbody is suitable for preservation, protection, reclamation, or enhancement of wilderness, aesthetic qualities, and ecological regimes, such as those designated under the Louisiana Natural and Scenic Rivers System or those designated by the Department of Natural Resources as waters of ecological significance.

Waterbodies designated for drinking water supply should be suitable for human consumption and general household use. Those waterbodies designated for shell fish propagation should be suitable to maintain biological systems that support economically important species of oysters, clams, mussel and other mollusks so that their productivity is preserved and the health of human consumers of those species is protected. Finally the use category, agriculture, indicates that a waterway should be suitable for the use of water for crop spraying, irrigation, livestock watering, poultry operations, and other farm purposes not related to human consumption.

Water Use Support Classification

LDEQ classifies water use support based upon either an evaluation of land use, citizen complaints, etc., or upon actual monitored data. Both evaluated and monitored assessments are available for the study area, and the results of both are shown in Table 14 below.

Evaluated Assessment. LDEQ has classified the waters of the Slidell Study Area as either PARTIALLY or NOT supporting their designated uses based upon an evaluated assessment.

Monitored Assessment. This classification is based on nearby water quality monitoring stations for the years 1991 through 1995. LDEQ uses a computer driven use-impairment index program described below. Note that metals, toxins, and organic/inorganic compound data are not utilized in the program.

Table 14 – LDEQ Water Use Support Classification

LDEQ Water Use Support Classification
Evaluated and Monitored Assessment

Waterbody Subsegment Code	Waterbody Description	Type ¹	Size ²	Degree of Support ³	PCR	SCR	FWP	ONR	DWS	SFP	AGR	Suspected Causes	Suspected Sources
040909	W-14 Main Diversion Canal--from its origin in the north end of the City of Slidell to its junction with Salt Bayou	R	9	N	N	N	N					Oil and grease, Organic enrichment/ Low DO, Pathogens	Collection System Failure, Inflow and Infiltration, Urban Runoff/ Storm Sewers, Other Urban Runoff, Land Disposal, Onsite Wastewater Systems (Septic Tanks)
041002	Lake Pontchartrain--East of Hwy 11 Bridge	E	62	P	N	P	P			NA		Mercury, Metals, Nitrogen, Nutrients, Organic Enrichment / Low DO, Pathogens, Phosphorus	Collection System Failure, Inflow and Infiltration, Urban Runoff/ Storm Sewers, Other Urban Runoff, Land Disposal, Onsite Wastewater Systems (Septic Tanks), Other, Atmospheric Deposition, Natural Sources, Upstream Sources, Source Unknown

¹Type indicates if a waterbody is either a river (R) or an estuary (E)

²Size refers to the total size of a waterbody segment, with rivers reported in miles and estuaries in square miles.

³Degree of support represents the waterbodies overall degree of use support based on the numerical average of values assigned to the individual use support statements.

Degree of support uses the levels of: fully supporting (F), fully supporting but threatened (T), partially supporting (P), and not supporting (N).

Designated uses include: primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP), outstanding natural resource (ONR), drinking water supply (DWS), shellfish propagation (SFP), and agriculture (AGR)

(NA) is used for areas that are Not Assessed

Support classification for a waterbody segment involves four levels of support classification as follows:

Parametric use support - keys on frequency of exceedances of criteria for primary and secondary parameters for each designated use of a waterbody.

Designated use support - determined by the least supporting parameter(s) within a designated use.

Station use support - determined by averaging all designated use supports at a monitoring station.

Waterbody use support - determined by the least supporting station(s) within a waterbody segment where there are multiple stations.

Current support classification criteria are presented in Table 15.

Table 15
Criteria for Parametric Support Classifications
Per Designated Use for Monitored Assessments

Degree of Support	Primary Determinant Parameters	Secondary Determinant Parameters
FULLY (F)	If the parameter criteria are exceeded in less than 10% of the samples analyzed.	If the parameter criteria are exceeded in less than 30% of the samples analyzed.
PARTIALLY (P)	If the parameter criteria are exceeded in 11% to 25% of the samples analyzed.	If the parameter criteria are exceeded in 31% to 75% of the samples analyzed.
NOT (N)	If the parameter criteria are exceeded in more than 25% of the samples analyzed.	If the parameter criteria are exceeded in more than 75% of the samples analyzed.

Primary and secondary determinant parameters within each designated use category were established in order to maximize the effectiveness of use support classification procedures. The parameters utilized for each use are listed in Table 16.

Table 16
Parameters Utilized for Use Support Determination by Designated Uses

Use	Primary Parameter	Secondary Parameter
Primary Contact Recreation (PCR)	Fecal Coliform	Temperature
Secondary Contact Recreation (SCR)	Fecal Coliform	None
Fish and Wildlife Propagation (FWP)	Dissolved Oxygen	Temperature, pH, chlorides, sulfates, total dissolved solids
Drinking Water Supply (DWS)	None	Color, total coliform, fecal coliform
Outstanding Natural Resource (ONR)	Turbidity	None

Using the computer driven use-impairment index program, LDEQ is able to determine the use support for each waterbody segment based upon their water quality data from stations within the segment. The most current data published by LDEQ is for the period of 1993 through 1997. There is no monitored data for the Slidell area.

EXISTING WATER QUALITY

Water Quality Data

Water and sediment samples were taken from the W-14 Canal at Florida Avenue (SS-1) and at Daney Street Bridge (SS-2). Data from these areas was compared to the Louisiana Water Quality Standards promulgated by LDEQ. In some cases, new standards published by the USEPA are more stringent than those promulgated by LDEQ. In these cases, data was compared to the newer, more stringent standard. There are no noted exceedances of the standards in the water samples that were taken.

Sediment Quality Benchmarks

There are no sediment quality standards promulgated by EPA or by the State of Louisiana. EPA Region IV has recommended the use of Sediment Quality Benchmarks promulgated by NOAA and by the Florida Department of Environmental Protection (FDEP). These benchmarks are shown in Table 17. While these benchmarks were derived for use in marine and estuarine environments, there is no evidence that these don't apply to freshwater as well. These benchmarks, while not criteria or standards, provide a basis on which to evaluate relative sediment quality. The results of the sediment tests were compared to the effects range - low (ER-L), threshold effects level (TEL), effects range - median (ER-M), and probable effects level (PEL) benchmarks, for those parameters tested. The following benchmark definitions are from "Toxicological

Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment Associated Biota”, (Jones, et. al., pg. 6-7).

ER-L: "The ER-L represents the lower 10th percentile of chemical concentrations observed or predicted to be associated with biological effects."

TEL: "The TEL represents the upper limit of sediment contaminant concentration dominated by no effects data."

ER-M: "The ER-M benchmark represents the median of chemical concentrations observed or predicted to be associated with biological effects."

PEL: "The PEL represents the lower limit of the range of contaminant concentrations that are usually or always associated with adverse biological effects."

Sediment Quality Data

Sediment quality can be an indicator of past water quality. For that reason, it is evaluated as part of the water quality assessment. There are no sediment monitoring stations in the Slidell area.

There were no definite exceedances of standards identified in either the water or the sediment samples. There were possible exceedances in a few parameters where the standards were below the detection limits. At the Florida Street site, these include Chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Dieldrin, Endrin, Acenaphthene, and Fluorene. The same parameters were possible exceedances at the Daney Street site except for Acenaphthene.

Data for this assessment was obtained from the EPA database STORET, and from LDEQ and USEPA publications and websites. These sources were used to obtain information on the specific aspects of potential water quality impacts.

Table 17
Sediment Quality Benchmarks

CHEMICAL	NOAA ^a		FDEP ^b	
	ER-L	ER-M	TEL	PEL
Inorganics (mg/kg dry weight)				
Antimony	2	25		
Arsenic	8.2	70	7.24	41.6
Cadmium	1.2	9.6	0.68	4.21
Chromium	81	370	52.3	160
Copper	34	270	18.7	108
Lead	46.7	218	30.2	112
Mercury	0.15	0.71	0.13	0.7
Nickel	20.9	51.6	15.9	42.8
Silver	1.0	3.7	0.73	1.77
Zinc	150	410	124	271
Organics (ug/kg dry weight)				
Acenaphthene	16	500	6.71	88.9
Acenaphthylene	44	640	5.87	128
Anthracene	85.3	1100	46.9	245
Benz(a)anthracene	261	1600	74.8	693
Benzo(a)pyrene	430	1600	88.8	763
Bis (2ethylhexyl)-phthalate			182	2647
Chlordane	0.5	6	2.26	4.79
Chrysene	384	2800	108	846
DDD,op'- + pp'-	2	20		
DDD,pp'-			1.19	4.77
DDE,pp'-	2.2	27	2.07	3.74
DDT,op'- + pp'-1	7			
DDT,pp'-			1.19	4.77
DDT,Total	1.58	46.1	3.89	51.7
Dibenzo(a,h)-anthracene	63.4	260	6.22	135
Dieldrin	0.02	8	0.72	4.3
Endrin	0.02	45		
Fluoranthene	600	5100	113	1494
Fluorene	19	540	21.2	144
Lindane			0.32	0.99
2-Methyl naphthalene	70	670	20.2	201
Naphthalene	160	2100	34.6	391
PAH, Total LMW	552	3160	312	1442
PAH, Total HMW	1700	9600	655	6676
PAH, Total	4022	44792	1684	16770
PCB, Total	22.7	180	21.6	189
Phenanthrene	240	1500	86.7	544
Pyrene	665	2600	153	1398

^aNOAA=National Oceanic and Atmospheric Administration; ER-L=effects range low; ER-M=effects range median.

^bFDEP=Florida Department of Environmental Protection; TEL=threshold effects level; PEL=probable effects level.

PROJECTED WATER QUALITY

Introduction

This section sets forth the projected impacts to water quality in the study area that might reasonably be expected to result from the implementation of the selected alternative. Impacts due to the no-action alternative or without project condition are also discussed. The selected alternative would reduce the frequency and severity of flooding in the Slidell area by implementing various channel improvements starting from the downstream side of Interstate 12 all the way to where it meets Interstate 10.

Future Without Project Conditions

For the without project condition, projected water quality for the study area is expected to remain similar to current conditions. Two detention ponds currently provide flood protection in the study area. They are located at Robert Boulevard and at the Whisperwood subdivision (headwaters of the W-14 Canal). Also, the city occasionally cleans and de-snags the canal. Municipal point sources, collection system failures, domestic wastewater lagoons, land disposal, industrial point sources, agriculture, urban runoff and storm sewers, and other sources such as atmospheric sources are the major factors that currently affect water quality in the study area, and they will continue doing so, in the absence of any improvements to their storm water management capability. These factors are expected to continue to be the major factors affecting water quality in the study area. Recent increased regulation and legislation, as well as an increase in public awareness of environmental issues, may result in slight reductions in the amount of pollutants released into the study area, which would improve its water quality somewhat.

Future With Project Conditions

If constructed, temporary construction activities may affect the water quality of the basin. These effects are discussed in the sections below.

Effects of Construction

The effects of construction may include (but are not limited to) increased turbidity and sedimentation, increased temperature, increased oxygen demand, and decreased oxygen; and contamination from construction equipment and operations. The effects of construction are, by nature, temporary and cease with the end of the construction period.

The item of greatest concern during construction activities is sediment runoff. Site preparation activities and construction of temporary access roads result in denuded areas

from which soil readily erodes. This erosion increases sedimentation and turbidity. The suspended sedimentary particles contribute dissolved minerals including sodium, potassium, calcium, magnesium, nitrates, and phosphates to the stream. These minerals act as nutrients in the water column, increasing plant growth. This, in turn, stimulates animal production and decomposition, increasing the oxygen demand. Simultaneously, the suspended particles decrease the light penetration and interfere with the photosynthetic production of oxygen. The particles also absorb solar energy from the sunlight and transform this energy into heat, elevating the temperature of the stream. Oxygen is less soluble in warm water than in cold water. The combination of these three effects results in an overall minor decrease in oxygen levels.

Louisiana Pollution Discharge Elimination System (NPDES) legislation requires a Pollution Prevention Plan (PPP) for construction projects which will disturb more than 1 acre of land in order to reduce sediment contamination into the waters of the United States due to the construction activities. Often included in the PPP are temporary and permanent sediment reduction controls such as hay bales, silt fences, sedimentation ponds, vehicle washing racks, and seeding and mulching of denuded areas. Even with these measures some effects can be expected. The effects of construction are generally temporary and subside when construction stops and denuded areas are restored.

Other Effects

The area from Fremaux Avenue to Interstate 10 is an earthen channel with grassy overbanks. Decomposition of grass clippings can cause an increase in the nutrient and Biological Oxygen Demand (BOD) levels in the water. This would result in a decrease in the Dissolved Oxygen (DO) levels. The widening of the channel could result in higher water temperatures. Maintenance of the improved channel could result in increased runoff of waters containing pesticides, herbicides, nutrients, and other contaminants into the lake.

Summary of Effects

The primary negative effects of this project are short-term project effects from construction that may include increased turbidity, sedimentation, and contamination from construction equipment and operations. An increase in any, or all of the following factors (temperature, nutrient, BOD, herbicides, and pesticides) is possible if the channel is widened and the overbanks are not well maintained allowing unabated grass growth.

REFERENCES

Jones, D.S.; Hull, R.N.; and Suter, G.W. II, "Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Sediment Associated Biota: 1996 Revision", USDOE-ES/ER/TM-95/RS, June 1996.

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USACE Waterways Experiment Station, "Incorporation of Environmental Features in Flood Control Channel Projects", May 1985.

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USEPA, "National Recommended Water Quality Criteria (Republication), Federal Register Part IV, 63 FR 68354-68364, EPA FRL-OW-6186-6A", 1998

GEOLOGY

GENERAL

The project, or study area, is located in the city of Slidell, St. Tammany Parish, Louisiana between Bayou Bonfouca and Interstate 10. Specifically, the study area is situated along the existing W-14 Canal, which is somewhat parallel to Interstate 10. Natural ground elevations in the study area range from approximately +9 to +18 feet N.G.V.D 29.

SURFACE AND SUBSURFACE

General

The surface along the study area, as well as the subsurface, consists almost entirely of Pleistocene deposits of the Prairie terrace. See the Soil and Geologic Profile plate in Annex 2 of this appendix. From approximate distance 9,500 to 10,500 feet on the profile plate, recent alluvium is found and extends down to approximately -25 feet N.G.V.D. 29. This alluvium consists of sand, silty-sand, silt, and lean clay. Pleistocene deposits generally consist of stiff to very stiff oxidized clays, interbedded with layers and lenses of silts and sands. Soil borings indicate a predominance of fat clay with lenses and layers of lean clay, silt, sand, and silty-sand from distance 0 to approximately 9,500 feet on the profile plate, and from distance 10,500 feet to the end of the study area. These deposits exist at the surface down to approximately -18 feet N.G.V.D. 29 and from approximately -25 to -45 feet N.G.V.D. 29. A layer of silty-sand with lenses of silt and sand lies between approximately -18 to -30 feet N.G.V.D. 29 and extends from distance 0 to approximately 10,500 feet on the profile plate. A zone of silty-sand and sand with lenses of silt and lean clay is located at approximately -45 feet N.G.V.D. 29 and extends to the bottom of the borings.

Groundwater

Groundwater generally reflects water table and artesian conditions; however, perched water tables are likely present in the near surface.

Relative Subsidence

Relative subsidence is 0.5ft/50 years in the study area.

GEOTECHNICAL INVESTIGATION

GENERAL

This section describes the geotechnical investigations, analysis and considerations needed for the preliminary design of the W-14 Canal Improvements Project. As stated previously, the purpose of the project is to provide flood control along the existing W-14 Canal in a developed urban residential section of the city of Slidell, St. Tammany Parish, Louisiana as authorized under the Southeast Louisiana (SELA) Project. This report, produced by the U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), examines the feasibility of improving the W-14 Canal for flood control. Due to this being a feasibility level report, designs presented in this report are not complete. The final geotechnical design on the detailed features will be presented in a Design

Documentation Report (DDR) to be developed in conjunction with the development of the project's plans and specification (P&S). Additional borings will be necessary prior to the detailed design of the project features, particularly around the Florida Avenue bridge to be replaced. Other additional investigations and analysis may be required during final design of the project. Additional investigations and analyses may be required to define the foundation soil strengths more completely.

PROJECT DESCRIPTION

The project area is located in the city of Slidell, St. Tammany Parish, Louisiana. See Plate G101 in Annex 4 of this appendix for the project location. The project includes improving approximately 4.1 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, clearing and snagging portions of the W-14 Canal, construction of a detention pond, expanding an existing pond, constructing overflow weirs, installing culverts, and relocating an existing bridge.

FIELD INVESTIGATIONS

Borings

MVN obtained six 5-inch diameter undisturbed borings for the project. All borings were drilled to an approximate depth of 80 feet. The approximate locations of these borings are shown on Plate B100 in Annex 3 of this appendix with plotted logs of the undisturbed borings presented on Plates B101 to B106.

The borings were classified and representative portions preserved for laboratory testing. While the borings are representative of subsurface conditions at their respective locations and for their respective vertical reaches, local variations characteristic of the subsurface materials of the region are anticipated.

LABORATORY TESTS

The laboratory testing on the undisturbed samples obtained from the borings was performed by MVN and Eustis Engineering Company, Inc. Laboratory testing was indicative of the relative density of cohesionless soils and the consistency of cohesive soils. Laboratory testing performed included natural water content, Atterberg liquid and plastic limits, unconfined compression shear (UCT) test, unconsolidated-undrained triaxial compression shear (Q) test, unit weight, and sieve analysis. The results of the laboratory tests are presented on the boring log plates (Plates B101 to B106) in Annex 3 of this appendix and in Figure 29.

PROJECT DESIGN

General

The results of the soil borings and laboratory tests were evaluated and the shear strength and density parameters were selected for design. In general, design shear strengths were based on the results of three-point unconsolidated undrained triaxial (Q) compression tests.

W-14 Canal Improvements Design

The laboratory tests results for borings SLD-1U to SLD-6U were used for the preliminary designs of the project.

Bridge Replacement Design

The laboratory tests results were used for the design of the Florida Avenue bridge replacement (i.e. project relocations) part of the project. These results included available soil shear strengths and stratifications from boring SLD-3U that was taken at the Florida Avenue bridge location.

REFERENCES

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3. U.S. Army Corps of Engineers, New Orleans District (MVN), 2001, Boring Logs for Borings No. SLD-1U through SLD-6U, Slidell, LA.

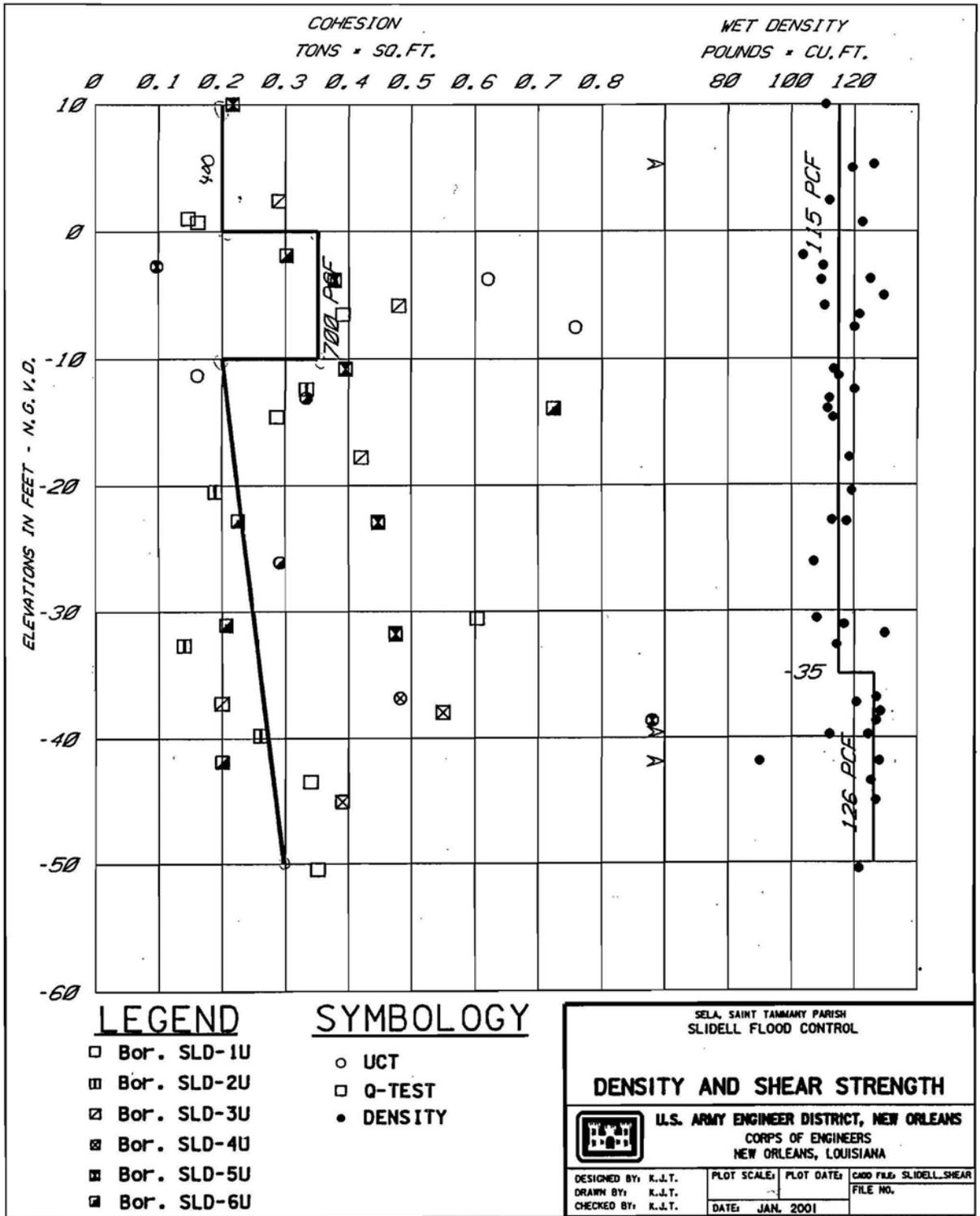


Figure 29. Density and Shear Strength Laboratory Tests Results

PROJECT DESIGN

General

This section describes the preliminary design that was completed in order to detail all the required features of the W-14 Canal Improvements Project so that a project cost estimate could be developed. As stated previously, the purpose of the project is to provide flood control along the existing W-14 Canal in a developed urban residential section of the city of Slidell, St. Tammany Parish, Louisiana as authorized under the Southeast Louisiana (SELA) Project. The city has a long history of repetitive flood damage due to rainfall events, with an inadequate drainage outlet at the end of the canal that is frequently affected by backwater from Lake Pontchartrain. This report, produced by the U.S. Army Corps of Engineers (USACE), New Orleans District (MVN), examines the feasibility of improving the W-14 Canal for flood control. Due to this being a feasibility level report, designs presented in this report are not complete. The final designs and details for the project features will be presented in a Design Documentation Report (DDR) to be developed in conjunction with the development of the project’s plans and specification (P&S). The opportunities for developing alternative solutions were limited by a number of factors, including occupancy of the land along the canal, the existing elevations of the area and the general purpose of the project.

Project Location and Description

The project area is located in the city of Slidell, St. Tammany Parish, Louisiana. See Figure 30 and Plate G101 in Annex 4 of this appendix for the project location.

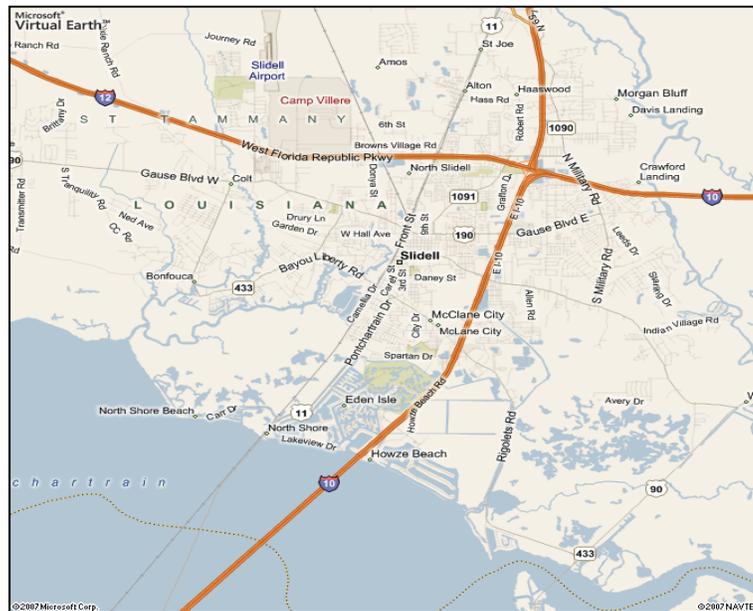


Figure 30. W-14 Canal Improvements Project Location

The recommended plan includes improving approximately 4.1 miles of the existing W-14 Canal by widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, clearing and snagging portions of the W-14 Canal, construction of a detention pond, expanding an existing pond, constructing overflow weirs, installing culverts, and relocating an existing bridge. The general layout of the project can be found on Plate 1 in Annex 1 of this appendix.

The W-14 Canal is a man-made creek that runs through the city, starting on the north end of the city, meandering predominantly south through several residential neighborhoods into the Fritchie Marsh, and eventually draining into Lake Pontchartrain. A typical reach of the existing W-14 Canal is shown as Figure 31.



Figure 31. Typical Reach of Existing W-14 Canal in Slidell, LA

To reasonably assess the feasibility of the proposed project, a detailed project cost estimate had to be developed. To develop a cost estimate, the USACE, Rock Island District (MVR), produced a preliminary design for improving the existing W-14 Canal and constructing the associated features. MVR chose a preliminary layout and examined the conditions and loads that would be typically applied to the project features. Then the

elements of the project features were designed according to the most demanding load case. These preliminary designs were used to estimate the quantity of material and work required to construct the project. The preliminary design was developed to minimize land disturbance to the full extent possible. The cost estimate for the Recommended Plan was developed by revising the cost estimate previously prepared by Rock Island District.

The project has 5 distinct features starting from the north end of the project to the south end. Feature No. 1 is the existing West Diversion Detention Pond that was constructed by the City of Slidell in 1998. Feature No. 2 is the enlargement of the existing Robert Boulevard detention basin and construction of three overflow weirs that would allow excess flow from the W-14 Canal into the detention basin. Feature No. 3, which begins at Fremaux Avenue and ends at Daney Street, is an earthen trapezoidal section with a 10' wide bottom and 3H:1V side slopes that would be approximately 10' deep. Feature No. 4, which begins at Daney Street and ends at Interstate 10, is a larger earthen trapezoidal channel with a 40' wide bottom and 3H:1V side slopes that would also be approximately 10' deep. Feature No. 5 is the clearing and snagging of the earthen channel from Interstate 12 to Fremaux Avenue.

The features of the project as discussed above are listed in Table 18. The project features are discussed in more detail below.

Table 18
W-14 Canal Improvements Project Features

No.	Project Feature
1	West Diversion Detention Pond
2	Robert Boulevard Detention pond & weirs
3	10' wide trapezoidal channel
4	40' wide trapezoidal channel
5	Clearing and Snagging W-14 Canal

West Diversion Pond

This feature of work was constructed by the City of Slidell. Construction began in early 1997 and was substantially completed in September 1998. The West Diversion Detention Pond is located on the west side of U. S. Highway 11 near North Boulevard. The construction of this project consisted of clearing and excavation of a parcel of land (approx. 13.8 acres) to construct a storm water detention pond, construction of an embankment berm, aggregate access road, removal of excess spoil material, perimeter fencing, and seeding and fertilizing. The pond bottom slopes starting at elevation is

+7 feet with a channel bottom elevation varying from elevation +6.00 to +5.5 feet. The local sponsor will request credit for in-kind contributions for this feature of work.

Robert Boulevard Detention Pond and Weirs

Improvements to an existing detention basin and construction of 3 weirs just north of Robert Boulevard would include deepening the bottom of the pond to elevation +1.5' and expanding the surface area by approximately 11.57 acres from 19.6 to 31.17 acres. The pond will have 3 lateral broad crested weirs constructed to connect the W-14 Canal to the pond.

10' Wide Trapezoidal Channel

Improvements to the canal will include the clearing and grubbing of the existing canal to remove unwanted vegetation, trees, and debris and reshaping of the existing canal to a trapezoidal section having a 10-ft bottom width with 3H:1V side slopes from the downstream side of Fremaux Avenue to the upstream side of the Daney Street Bridge (approximately 2,960 ft in length).

40' Wide Trapezoidal Channel

This feature of work was recently constructed by St. Tammany Parish. Improvements to the existing canal included the clearing and grubbing of the existing canal to remove unwanted vegetation, trees, and debris and reshaping of the existing canal to a trapezoidal section having a 40-ft bottom width with 3H:1V side slopes from the downstream side of the Daney Street Bridge to the upstream side of the Interstate 10 Bridge (approx. 6,400 ft in length). The local sponsor will request credit for in-kind contributions for this feature of work.

Clearing and Snagging W-14 Canal

Improvements to the existing canal will include the clearing and snagging of the existing canal to remove unwanted vegetation, trees, and debris (approximately 11,135 ft in length).

CIVIL DESIGN

Project Design Datums

Horizontal control for this project is N.A.D. 83, Louisiana South Zone 1702, U.S. Feet and was established from N.G.S. Monument 52H026. Vertical control is N.G.V.D. 29 and was established from benchmark 52-V-078 (Reference 21). To convert elevations from N.G.V.D. 29 datum to N.A.V.D. 88 datum, subtract 0.8 feet. All coordinates

referenced herein are based on this state plane coordinate system. MVR used the design inverts and slopes provided by MVN (Reference 50) and assumed the improved W-14 Canal would follow the same course as the existing W-14 Canal.

Project Design Alignment

One of the first steps required to produce a preliminary design was to establish a horizontal alignment and a profile for the improved canal. This is necessary to reasonably estimate the quantity of material that must be excavated. MVN provided MVR three sets of data to establish the alignment. The first was a set of drawings showing the layout of the work (Reference 28). These drawings established the ends of all the sections of the project in state plane coordinates. The second was a set of electronic files from a detailed centerline profile survey of the existing W-14 Canal (Reference 21). These files provided the horizontal, vertical and station coordinates for each ground shot along the canal centerline. The third was a Microsoft Excel spreadsheet that listed the elevations for both the existing and design inverts and the elevations for the top of bank along the length of the canal (Reference 50); however, this file listed horizontal control in river mile coordinates instead of stations.

The alignment and profile for improving the W-14 Canal was established by combining and cross-indexing these three sets of data. Combining the state plane coordinate data from the drawings with the stationing data from survey files creates station coordinates for the ends of the necessary sections. This was combined with the design elevations in the Excel spreadsheet to establish the horizontal and vertical coordinates of the points along the centerline of the existing canal. These coordinates are expressed in terms of stationing, river miles and river footing. The final product is a profile with sufficient accuracy to estimate quantities of earthwork and soil pressure loads for improving the canal.

A new horizontal alignment for the improved canal was not created for the preliminary design of the project. MVR simply assumed the centerline of the improved canal has the same alignment as the existing canal. When the final design is being completed for the project, the improved canal may not follow the exact alignment as the existing canal. The design alignment for this project is shown on Plates C100 to C104 in Annex 4 of this appendix. New horizontal and vertical control should also be established for construction of the project and would be shown on the project's plans.

Project Design Topographic Information

The natural ground profile was surveyed along the existing canal alignment. Not all major topographic features were referenced during the survey. Existing contours of the

W-14 Canal to the top of bank were created using this topographic information to develop preliminary plans and profiles as necessary for design. Cross sections of the existing W-14 Canal were taken to determine its hydraulic capabilities.

W-14 Canal Improvements Design Invert

A new design invert for the canal was developed during the design of the project to improve flood flow capacity. The new design invert of the W-14 Canal is shown on Plate C105 in Annex 4 of this appendix.

West Diversion Pond

This is an existing pond that is being included as part of the project. No additional improvements will be made.

Robert Boulevard Detention Pond and Weir

There is an existing detention pond located in this area that would be improved which takes water from the W-14 Canal during high water. Improvements to the existing pond include deepening it to an invert elevation of +1.5 and enlarging it to approximately 31.17 acres. There would also be 3 lateral broad crested weirs constructed to connect the W-14 Canal to the pond. The weirs would have a top elevation of 9.2' and a length of 25.8', 25.3', and 42.1'. The pond would be drained at two of the weirs by a 24" RCP that is approximately 30' in length with an invert elevation of +1.5'. Two of the three weirs would have culverts provided with flap gates at their downstream end to prevent backflow from the canal into the pond. The excavation required for the pond is approximately 200,000 cubic yards. Refer to Annex 7 of this appendix.

10' Wide Trapezoidal Channel

The existing canal from Fremaux Avenue to Daney Street would be desnagged and cleared of vegetation, trees and debris. The existing canal would be reshaped and compacted to a trapezoidal channel with a 10' wide bottom and 3H:1V side slopes.

40' Wide Trapezoidal Channel

The existing canal from Daney Street to Interstate 10 would be desnagged and cleared of vegetation, trees and debris. The existing canal would be reshaped and compacted to a trapezoidal channel with a 40' wide bottom and 3H:1V side slopes.

Project Excavation and Tree Clearing Quantities

The program *Inroads* for MicroStation was used to calculate the quantities of material excavation required to construct all the sections of the project. *Inroads* is a program that calculates volumes of cut and fill from a digital terrain model (DTM), a design profile, and a specified cross section. MVN provided MVR with a three-dimensional MicroStation design file with contours along the W-14 Canal (Reference 28). MVN also provided MVR with a detailed survey along the existing W-14 Canal and the design cross section and inverts for the improved canal (Reference 21). These three sets of data were combined to produce a DTM for the existing and improved canal, with *Inroads* used to calculate quantities of material excavation.

A particular assumption was made that may limit the accuracy of the material excavation quantity estimate. MVR did not have access to the horizontal position of the top of bank points (i.e. top of bank width); instead, MVR used the cross sections MVN provided for the *Preliminary Design of Slidell Bridges* report (Reference 51). A comparison of these cross sections with photographs of other parts of the canal (also provided by MVN) shows the canal width does not vary much over its length. With this information, it was assumed that the canal width at the top of bank is comparable to the top of bank width shown in the *Bridges* report.

MVR estimated the quantity of tree clearing, grubbing, and desnagging required for the entire length of canal. Table 19 lists the estimated quantities of material to be excavated for construction of project.

Table 19
Estimated Excavation Quantities for the Project

No.	Project Feature	Quantity
1	Robert Boulevard detention pond	200,000 CY
2	10' wide trapezoidal channel	7,700 CY
3	40' wide trapezoidal channel	68,200 CY
4	Clearing and Snagging W-14 Canal	9,360 LF

The volumes listed in this table are in-situ volumes. They do not include shrinkage or swelling factors.

Disposal of Excavation Materials

It was assumed that the majority of the excavated material would be hauled off-site and disposed at an approved landfill.

Project Relocations

The construction of this project will conflict with numerous aerial, surface and underground utilities. See the PROJECT RELOCATIONS section of this appendix for a more detailed description of the necessary project utility relocations. The replacement of the Florida Avenue Bridge is also part of project relocations and detailed descriptions are included in the following sections.

STRUCTURAL DESIGN

GENERAL

The structural features of this project include the detention pond overflow weirs and the replacement of the Florida Avenue bridge (i.e. as a project relocation).

Robert Boulevard Overflow Weirs

The overflow weirs are designed to allow excess flow from the W-14 Canal into a retention basin. They are 25.3', 25.8', and 42.1' long and approximately 8' high and are located immediately upstream of Robert Boulevard, west of the canal. The slope leading down from the canal to the retention basin would be armored with riprap and either concrete pavement or erosion control blocks along the flow path. On two of the weirs, 30" bituminous coated corrugated pipe would be installed in the weir. Check valves would be installed on the canal side of the weir.

Bridge Replacement

As stated, the project involves widening the existing W-14 Canal and lowering the canal invert to improve flood flow capacity. Removal and replacement of one vehicle bridge as part of project relocations would be required due to this widening to improve the flood flow capacity. The bridge to be removed and replaced spans the W-14 Canal at Florida Avenue. Figure 32 shows the existing Florida Avenue Bridge looking southwest (downstream).



Figure 32. Existing Florida Avenue Bridge looking Southwest

The bridge is located in a residential neighborhood of the city of Slidell and provides a residential level of service. The predominant traffic is personal vehicles with occasional truck traffic.

To reasonably ascertain the feasibility of the project, preliminary designs of the bridge replacement was required to develop a cost estimate for project relocation features.

The loads the replacement bridge would typically be subjected to were examined and the elements were sized accordingly. As this is a feasibility level design, the structure was not examined under all code-specified load cases and only AASHTO Load Group I was used for the design loads. Article 3.22 of AASHTO (Reference 15, pg 31) requires bridge designers to consider up to ten different cases of load combinations in their designs. AASHTO refers to an individual load combination as a load group. Each

load group has its own set of individual load types and factors. To meet the objective of this design, designers considered only Load Group I. Of the 10 load groups, Load Group I results in the largest combination of loads and represents the typical loading of a bridge. The designers considered the following loads (refer to article 3 of AASHTO):

- A. Dead Loads, D. Dead loads consist of the weight of the structure, parapets, wearing surface, and sidewalk.
- B. Live Loads, L. Live loads consist of the design HS20 (English) and HST-18 (Metric) vehicles from AASHTO and LaDOTD respectively, and the sidewalk live load from AASHTO.
- C. Impact Loads, I. Impact loads represent the dynamic effect of the sudden transfer of the live loads to the structure. It is a function of the span length and applies only to elements above the ground line.
- D. Earth Pressures, E. The loads resulting from earth pressures represent the lateral loads the soil applies to the bridge elements.
- E. Longitudinal Forces, LF. Longitudinal loads were applied only to the abutment design. The designers did not consider longitudinal forces for the deck/superstructure.
- F. Designers did not consider the loads listed in f through m below in the preliminary design of the bridges. The final designs of the bridges for development of the project's P&S and subsequent DDR will require the designers to consider these loads.
- G. Centrifugal Force, CF. Centrifugal forces apply to bridges on a horizontally curved section of road. The Florida Avenue bridge is straight.
- H. Buoyancy, B. The only buoyant elements the designers used are the hollow-core deck beams. It is assumed that the likelihood of floodwaters reaching above the low chord elevations is small (Reference 29, design flood event = 100-yr). This should be verified during the final designs of the bridge. Furthermore, a beam with a 5" thick wearing surface weighs 955 lb/ft. The buoyant force on a beam is 667 lbs/ft. Buoyancy should not adversely affect the design.
- I. Stream Flow Pressure, SF. The design requires the replacement bridges to completely span the improved channel. It is assumed that the likelihood of the floodwaters reaching above the low chord elevations is small (Reference 29, design flood event = 100-yr). This should be verified during the final designs of the bridges. No bridge elements would be subjected to stream flow pressure.

- J. Wind Load, W. The deck-beam design of the superstructure would have strong diaphragm action against wind loads. MVR designers determined wind load effects would be negligible.
- K. Wind on Live Load, WL. Designing for the WL force is beyond the scope of work for this feasibility level design.
- L. Rib shortening, Shrinkage, and Temperature forces, R+S+T. Consideration of R+S+T loads is beyond the scope of work for this feasibility level design.
- M. Earthquake Loads, EQ. Division IA, Article 3.1 of AASHTO (Reference 15, pg 397) states:

“No detailed seismic analysis is required for any single span bridge or for any bridge in Seismic Performance Category A. For single span bridges (Article 3.11) and bridges classified as SPC A (Section 5) the connections must be designed for specified forces and must also meet minimum support length requirements.”

AASHTO specifies the SPC of a bridge according to its importance classification (Reference 15, pg 399, Art. 3.3) and the site acceleration coefficient. The acceleration coefficient is 2% for Slidell, LA (Reference 15, pg 397, Fig 1-5). Table 3.4 of AASHTO (Reference 15, pg 399) assigns SPC A for the bridge regardless of its importance class. Furthermore, the bridge would be single span bridge (Reference 29). AASHTO requires the designers to ensure stability at the bearings and minimum support length requirements are met in lieu of a more detailed seismic analysis.

- N. Ice Loads, ICE. The Florida Avenue bridge is located in the moderate climate of southern Louisiana. Designers assumed the bridge would not be subjected to any ice loads.

The design of the new vertical road profiles was based on existing centerline road grades and the elevation of the new bridge as calculated by the 100-year rainfall runoff elevation for the improved channel. With the low chord elevation given, 32 inches was added for the thickness of the deck beam (27") and overlay (5") to get an elevation at the edge of the new roadway. Designers assumed a cross slope of 2.5% to compute a new centerline elevation. Pavement removal also needed to be kept to a minimum. The LaDOTD Bridge Design Manual shows that approach slabs should have a minimum length of 12,000 millimeters (39.6 ft.). With the bridge being approximately 55 feet long (all starting at STA. 5+00) and having two 7 foot abutments, two 40 foot approach slabs, and two 20 foot lengths of new pavement, approximately 190 linear feet of new vertical profile would be required from STA. 4+30 to STA. 6+20. The profile's design also

followed previous design methods for the constructed bridge at Canal No. 3, Jefferson Parish, Louisiana. The maximum vertical grade for all bridges was just over 6.0% with 30 and 40 foot vertical curves used for transitioning.

The design criterion for the bridge superstructure was to raise the bridge above the 100-year rainfall event and to keep the road rise to a minimum. Prestressed concrete multi-beam, steel multi-beam, deck slab and prestressed deck beams were several bridge types that were investigated to meet the design constraints and loading requirements. The investigation led to the selection of prestressed deck beams as they provided the best strength/depth ratio that was required for these bridge sites. The section that was selected was an AASHTO-PCI section BI-48. The state of Louisiana does not have standards for the design of prestressed deck beams; therefore, the Illinois' "Prestressed Concrete Manual" was used. The Illinois DOT recommends a 5 inch concrete overlay with one layer of reinforcement. Overlays of 2 and 3 inches have been evaluated but reflective cracks were found to be more prevalent than in thicker overlays. The beams would be cast with camber to compensate for the dead weight and the vertical curve of the bridge.

Two types of abutments were investigated for the replacement bridge substructure. The first was an abutment that also served as a retaining wall. It had a pile supported base slab that was flush with the bottom of the channel. The second consisted of the pile cap being located directly beneath the roadway, and the piles extending below the channel floor through the soil retained by the channel walls. It was assumed the sheet piling would be designed to support the soil and all loads applied by the piles. The second type was selected because there would be less excavation, less concrete, no cofferdams or dewatering, and no impact to construction in the event of a flood.

For the foundation of the bridge, the abutments would be founded on 16-inch square prestressed concrete piles. The Pile Group Analysis (CPGA) computer program was used to analyze the pile group. At the time of the analysis, soil borings were not available. Designers used pile capacity curves provided by MVN instead. The piles were assumed to be supported by the soil only through skin friction. The soil modulus was reduced for group action, which is dependant on the spacing of the piles in the direction of the horizontal loading. Piles were assumed fully supported, and were minimally spaced three pile widths between centerlines. Pile strengths were greater than the pile-soil connection.

Quantities were developed from the preliminary design drawings. As-built information of the existing bridges and adjacent features were not available. Development of the cost estimate for the bridge features as project relocations are documented in the PROJECT COST ESTIMATE section of this appendix.

PROJECT DESIGN SUMMARY

The W-14 Canal Improvements Project's design included preliminary designs for several features as mentioned in this section. The preliminary designs were completed to produce a detailed project cost estimate that had to be developed to reasonably assess the feasibility of the project. The project cost estimate developed as a result of this preliminary design is presented in the PROJECT COST ESTIMATE section of this appendix. Due to this being a feasibility level report, more detailed analyses and designs for the project will be presented in a Design Documentation Report (DDR) to be developed in conjunction with the development of the project's plans and specification (P&S).

Due to this being a feasibility level report with preliminary designs the design criteria and standards used, along with several of the references in the REFERENCES section below, may be out of date. Current designs, design criteria, and standards should be used while developing the final designs of the features and plans and specifications (P&S) for the project.

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PROJECT RELOCATIONS

SUMMARY

Scope and Purpose

Relocation data was collected, tabulated and detailed in this appendix by the U.S. Army Corps of Engineers, New Orleans District, Engineering Division, Relocations Section, to a feasibility level of design. The Relocations Section made contact with land owners to obtain detailed information on existing facilities. The Relocations Section then made assumptions based on the proposed project design and project location to determine project relocation requirements. The cost estimates presented in this report were developed by Rock Island and New Orleans Districts, by modifying previous cost estimates developed by New Orleans District in a 2000 feasibility study of the same project, and by developing cost estimates for the added relocation items. These relocation costs represent a feasibility level of design and will be further refined during the development of the project's plans and specifications (P&S).

Implementation of the W-14 Canal Improvements Project will improve the drainage of the W-14 Canal in the Slidell, LA area, between U. S. Interstate 12 and U.S. Interstate 10, to mitigate flooding in the area. The plan includes clearing and snagging the W-14 Canal from U.S. Interstate 12 to Fremaux Avenue. From Fremaux Avenue to U.S. Interstate 10, the canal will have earthen improvements. The West Diversion detention pond has been constructed by the City of Slidell. The detention pond at Robert Boulevard will be enlarged and deepened. In addition to utilities, project relocations include one bridge that will be replaced to allow a better flow of floodwaters. The bridge to be replaced is the Florida Avenue bridge. The bridge replacement location will have alternate access available to the locals precluding the need for detour roadways.

Estimated Relocations Costs

The total estimated cost for relocations of pipe, power and communication lines is \$424,229.36. This figure includes basic costs for the relocation items plus contingency and escalation. Estimated relocation costs for utilities are summarized in Table 20. The relocation items identified in Table 20 are detailed in the following pages. The relocations cost of the Florida Avenue Bridge is included in PROJECT COST ESTIMATE section of this appendix.

Table 20
Utility Relocation Items and Costs

Relocation Item	Estimated Relocation Cost
P13	10,299.86
P14	7,851.78
P15	3,675.55
P16	9,939.89
P17	10,845.14
P21	9,927.02
P22	12,413.37
P23	674.00
T5	207387.48
T6	7,162.13
T8	548.25
T9	8,876.5
G4	28,623.93
W5	12,794.40
W6	28,940.81
W7	19,682.37
S4	15,962.31
S5	26,353.38
M1	2,271.20
Total	424,229.36
*Total cost includes contract cost, contingency and escalation	

Authority for Accomplishing Relocations

The Southeast Louisiana Project (SELA) was authorized by Section 108 of the Fiscal Year 1996 Energy and Water Development Appropriation Act. The Sponsor is responsible for providing all lands, easements, relocations, rights-of-way, suitable borrow and excavated material disposal areas (LERRD's). The Sponsor shall perform or ensure the performance of all relocations determined by the Federal Government to be necessary for the construction, operation and maintenance of the project.

DESCRIPTION OF AFFECTED FACILITIES, PROPOSED RELOCATIONS, AND COSTS

Roadways and Bridges

All roadways and bridges requiring replacement as part of the project are accounted for in PROJECT DESIGN section of the appendix. The bridge to be replaced as a project relocation is the Florida Avenue bridge that traverses the W-14 Canal. See Figure 32 in the PROJECT DESIGN section of this appendix.

Utilities

Note that RDB refers to Right Descending Bank (the right hand side bank when looking downstream), and LDB refers to Left Descending Bank. All utilities affected by the project are indicated on maps located in Annex 8 of this appendix.

1. CLECO.

- a. Item P-13 consists of one power pole owned by CLECO. Construction of the new Florida Avenue Bridge will affect the power pole on the south side of Florida Avenue at approximate station 221+39, on the LDB. In order to accommodate the bridge construction, the power pole would require relocation along with the attached single power line being relocated to the new power pole location. This work would be performed by CLECO. The estimated cost for this relocation is as follows:

Relocate one power pole and the power line = \$10,299.86.

- b. Item P-14 consists of one guy pole and 3 guy wires owned by CLECO. Construction of the new Florida Avenue Bridge will affect these facilities on the south side of Florida Avenue at approximate station 221+39, on the RDB. In order to accommodate the bridge construction, the guy pole and guy wires would require relocation. This work would be performed by CLECO. The estimated cost for this relocation is as follows:

Relocate one guy pole and 3 guy wires = \$7,851.78.

- c. Item P-15 consists of one guy pole and guy wire owned by CLECO. Construction of the channel by the Florida Avenue Bridge will affect these facilities on the north side of Florida Avenue at approximate station 221+99, on the RDB. In order to accommodate the bridge construction, the guy pole and wire would require relocation. This work would be performed by CLECO. The estimated cost for this relocation is as follows:

Relocate one guy pole and guy wire = \$3,675.55.

- d. Item P-16 consists of 4 guy wires owned by CLECO. Construction of the channel by the Florida Avenue Bridge will affect these facilities on the north side of Florida Avenue, on the RDB. To accommodate project construction, these guy wires would require relocation to a new guy pole on the opposite bank. The estimated cost for this relocation is as follows:

Relocate 4 guy wires to new guy pole = \$9,939.89.

- e. Item P-21 consists of 3 power poles. One small power pole 60 feet downstream (south) of the Cousin Street Bridge, on the LDB. This pole only carries one 240V overhead residential service (it also carries Charter and AT&T/Bellsouth overhead lines that go underground at this pole). Two additional smaller poles are about 100 feet further south that carry the same overhead 240V service. Project construction will require these 3 poles to be relocated further from the canal. The estimated cost for this relocation is as follows:

Relocate 3 power poles = \$10,845.14.

2. Charter Communications.

- a. Item P-17 consists of 90 feet of one overhead 0.625 inch coaxial cable, and about 170 feet of an overhead wire bundle consisting of one 0.5 inch fiber optic and two 0.625 inch coaxial cables. These wires piggyback on CLECO poles on the south side of Florida Avenue Bridge at approximate station 221+39, with one pole requiring relocation. Construction of the Florida Avenue Bridge will require these cables to be at least temporarily relocated during construction. The estimated cost for this relocation is as follows:

Relocate Charter's cables to relocated CLECO power pole location = \$9,927.02.

- b. Item P-22 consists of an underground 0.625 inch coaxial cable starting from a CLECO pole 60' south of the Cousin Street Bridge on the LDB. It extends for about 260 feet underground, following the LDB going south. It would need to be relocated farther from the canal. Since the CLECO pole where the underground line starts would need to be relocated farther from the canal, about 100 feet of overhead coaxial cable that goes to this pole would need to be relocated to the new pole location. The estimated cost for this relocation is as follows:

Relocate Charter's underground cable farther from the canal = \$12,413.37.

- c. Item P-23 consists of one overhead 0.625 inch coaxial cable. Construction activities in the vicinity of the Cousin Street Bridge would require about 190 feet of cable where it crosses the canal at the bridge to be relocated to the new CLECO pole location. The estimated cost for this relocation is as follows:

Relocate Charter's overhead cable to relocated pole location = \$674.00.

3. AT&T / Bell South.

- a. Item T-5 (Figure 33) consists of a 24 inch phone conduit owned by Bell South. Construction of the new Florida Avenue Bridge will affect this Bell South utility at approximate station 222+19. The existing conduit is about 55 feet long and crosses the canal about 6 inches downstream from the existing bridge. Bell South records identify the conduit as a 30 inch conduit, but it measures at 23.9 inch diameter, based on measuring the circumference. It holds fifteen 4 inch ducts, many of which are empty. Some of the ducts contain: one 2100-pair copper cable; one 1200-pair copper cable; two 1500-pair copper cables; one air pressure cable; and two fiber optic cables. Temporary service will be required during bridge construction. Upon bridge construction completion, Bell South would install new conduits along their original alignment. The new conduit is assumed to be about the same length as the original conduit. The relocation of Bell South's conduit would be performed by Bell South. The estimated cost for this relocation is as follows:

Install temporary conduit to provide continuous service during bridge construction. Upon bridge construction completion, install new conduits along their original alignment = \$207,387.48.



Figure 33. Item T-5, 24-inch phone conduit (Bellsouth)

- b. Item T-6 consists of a 2 inch phone conduit owned by Bell South, about 55 feet in length crossing the canal attached to the upstream side of the existing Florida Avenue Bridge, containing a 300-pair copper cable. Construction of the new Florida Avenue Bridge will affect this Bell South utility at approximate station 222+19. Temporary service will be required during bridge construction. Upon bridge construction completion, Bell South would install a new conduit along their original alignment. The relocation of Bell South's conduit would be performed by Bell South. The estimated cost for this relocation is as follows:

Install temporary conduit to provide continuous service during bridge construction. Upon bridge construction completion, install a new conduit along their original alignment = \$7,162.13.

- c. Item T-8 consists of an overhead cable, 200-pair copper, crossing the Cousin Street Bridge. The cable crosses from the RDB side and ends at the CLECO power pole which is at the LDB end of the bridge. About 120 feet of cable would need to be relocated to a yet to be determined relocated CLECO pole, or removed. The estimated cost for this relocation is as follows:

Relocate the cable to a relocated CLECO power pole = \$548.25.

- d. Item T-9 consists of 260 feet of an underground cable, 25-pair copper, starting at a CLECO pole 60 feet south of the Cousin Street Bridge on the LDB. Since that pole needs to be relocated farther from the canal, the 100

feet of overhead cable that lead to this pole would need to be relocated to the relocated pole location. The estimated cost for this relocation is as follows:

Relocate the underground cable farther from the canal = \$8,876.50

4. ATMOS Energy.

- a. Item G-4 is a 3 inch gas main, on supports, owned by ATMOS Energy. Construction of the channel will affect this utility on the south side of Cousin Street at approximate station 187+75. About 100 feet of main would need to be removed and replaced above the new channel cross section after channel construction. Temporary gas service will need to be maintained during project construction. The estimated cost for this relocation is as follows:

Remove gas main, temporarily provide gas service during channel construction, install a new 3 inch gas main above the new channel cross section = \$28,623.93.

5. City of Slidell.

- a. Item W-5 is a 6 inch PVC (C-900) water pipe that goes under the canal just downstream (south) of the Florida Avenue Bridge. Replacement of the bridge will affect about 100 feet of this waterline. Temporary water service may need to be maintained during bridge construction. The waterline will be replaced after construction is complete. The relocation would be performed by a Government contractor. The estimated cost for this relocation is as follows:

Temporarily provide water service during construction and install a new water line = \$12,794.40.

- b. Item W-6 is a 12 inch PVC waterline, pile bent supported, in a steel casing owned by the City of Slidell. Construction of the channel south of Fremaux Avenue will affect approximately 100 feet of this waterline at approximate station 200+31. Temporary water service will need to be maintained during channel construction. Upon channel construction completion, install a new 12 inch waterline and a new support system along the City of Slidell's original alignment. The free span between supports should be increased from the existing 24 feet to at least 45 feet between the new supports. The relocation would be performed by the

Government contractor. The estimated cost for this relocation is as follows:

Temporarily provide water service during channel construction and upon construction completion, install a new 12 inch waterline and a new support system with a 45 foot minimum span, and remove the temporary service = \$28,940.81.

- c. Item W-7 is a 2 inch iron waterline crossing the channel on the upstream (north) side of the Cousin Street Bridge. About 150 feet of waterline may be affected. Temporary water service may need to be maintained during construction. The relocation would be performed by a Government contractor. The estimated cost for this relocation is as follows:

Temporarily provide water service during construction, and upon completion of construction install new water line = \$19,682.37.

Items S-4 and S-5 have already been completed.

- d. Item S-4 is a buried gravity sewer pipeline (size unknown) owned by the City of Slidell. Approximately 200 feet of the sewer line will be affected by project construction, about 1,400 feet south of Daney Street, at approximate station 158+34. The present line is buried 18 to 22 inches below the canal bottom. A new line would be installed by open cut method and placed approximately 5 feet below the new channel bottom. The old pipeline would then be removed. The estimated cost for this relocation is as follows:

Install approximately 200 feet of new sewer line buried 5 feet below the new channel bottom, and remove the old line = \$15,962.31.

- e. Item S-5 is a force main buried below the canal, approximately 18 inch diameter pipe, owned by the City of Slidell. Approximately 200 feet of this main will be affected by project construction, about 1400 feet south of Daney Street, near Item S-4. A new main would be installed by open cut method and would be placed approximately 5 feet below the new channel bottom. The old main would then be removed. The estimated cost for this relocation is as follows:

Install approximately 200 feet of new 18 inch force main and remove the old main = \$26,353.38.

6. United States Geological Survey (USGS).

- a. Item M-1 (Figure 34) is a USGS stream gaging station attached to the Daney Street Bridge. It would need to be removed and reset after channel construction. The estimated cost for this relocation is as follows:

Remove and reset one USGS gaging stations = \$2,271.20.



Figure 34. Item M-1, USGS Stream Gaging Station at Daney Street Bridge

Storm Drainage Utilities

All storm drainage utilities, both parallel and intersecting project construction, are not identified as relocation items. Examples of storm drainage utilities within the project right-of-way are shown in the following pictures.



Figure 35. Upstream Robert Blvd, LDB, drain



Figure 36. 60-inch CMP Upstream Robert Blvd, LDB

PROJECT IMPLEMENTATION

GENERAL

In order to develop a detailed project cost estimate to a fully funded amount as required, a project implementation schedule had to be developed. The schedule details the activities required to complete the project with approximate dates for completion of that activity.

PROJECT IMPLEMENTATION SCHEDULE

To implement the project, a number of activities would be required, starting with feasibility level approval of the project. The estimated implementation schedule for the project is shown as Table 21.

Table 21
Estimated Implementation Schedule

Date	Project Activity
Dec 2011	Submit 533(d) Report for USACE Division Approval
Mar 2012	USACE Division Approval of Report Acknowledged
Mar 2012	Project Design Funding Received / Begin Real Estate Acquisition
Apr 2012	Begin DDR and Project Plans & Specifications (P&S)
Oct 2013	P&S and Independent Technical Review (ITR) Complete to 95%
Dec 2013	BCOE Review of P&S Complete / Real Estate Acquisition Complete
Jan 2014	Advertise for Construction Contract
Mar 2014	Award Construction Contract
Sep 2016	Construction Complete
Feb 2017	Project Closed Out

PROJECT IMPLEMENTATION RESPONSIBILITIES

MVN would handle the responsibilities for implementing the project, including getting approval of the 533(d) report, development of the project's P&S and DDR, project reviews, and solicitation and administration of the project's construction contracts. The project would be cost shared between the Federal government and the sponsor. After construction of the project is complete, the project would need to be maintained and operated by the local sponsor.

PROJECT ACCESS

Access to the construction site would be through public dedicated roadway right-of-ways and temporary and permanent construction easements. Refer to Volume II, Appendix D - Real Estate Plan, of this 533(d) report for additional real estate information.

PROJECT COST ESTIMATE

BASIS OF COST ESTIMATE

The cost estimate for the recommended plan was prepared utilizing MII. The MII estimate is included in Annex 9 of this appendix. The estimated costs were based upon an analysis of each line item evaluating quantity, production rate, and time, together with the appropriate equipment, labor, and material costs.

The construction site is located in St. Tammany Parish and is in the Metropolitan New Orleans area and is accessible by land. Access is easily provided from ground level streets such as U.S. Hwy 11, Robert Blvd, Gause Blvd, and Daney Street.

All the construction work (e.g., clearing and snagging, excavation, and bridge construction) is common to MVN. In addition, some of the construction material – including concrete, structural steel, steel sheet piling, and piping are available locally.

CONTINGENCIES

Contingencies are based on a Cost Risk Analysis using Crystal Ball software.

ESCALATION

Escalation is based upon the US Army Corps of Engineers Engineering Manual (EM) 1110-2-1304, Civil Works Construction Cost Index System (CWCCISS) revised 31 Mar 09. Escalation has been included to the anticipated midpoint of the construction features.

COST AND SCHEDULE RISK ANALYSIS

A cost and schedule risk analysis was not required for this project as it does not meet the \$40 million threshold.

PROJECT CONSTRUCTION SEQUENCE

GENERAL

A construction sequence for the Slidell, LA W-14 Canal Improvements Project was developed to assist with the development of the project cost estimate. The project was divided into five separate contracts, as presented in Table 22. The construction award start date for the project was assumed to be March 2014. Overall, the project is assumed to require a three year construction period to complete.

Table 22
Project Construction Sequence

<u>Activity:</u>	<u>Duration</u>	<u>Start Date:</u>	<u>Finish Date:</u>
Part 1: Clear and Snag Channel, South of I-12 to Fremaux Ave.	5 months	Mar 2014	Aug 2014
Part 2: Robert Blvd Detention Pond and Weir	24 months	Mar 2014	Mar 2016
Part 3: West Diversion Pond and Control Structure	*	N/A	N/A
Part 4: 10' Wide Trapezoidal Channel, Fremaux Ave. to Daney St.	7 months	Mar 2014	Sep 2014
Part 5: 40' Wide Trapezoidal Channel, Daney St. to I-10	**	N/A	N/A

*Note: This feature of work was substantially completed by the City of Slidell in 1998.

**Note: This feature of work has been constructed by St. Tammany Parish.

The above features of work have been completed in accordance with Section 108 of the Fiscal Year 1996 Appropriations Act and Section 533 (b) of the Water Resources Development Act of 1996. The aforementioned legislation directs that the cost of any work performed by the non-Federal interests subsequent to the dates of approved reports, and determined by the Secretary of the Army to be a compatible and integral part of the projects, shall be credited toward the non-Federal share of the projects.

APPENDIX D

REAL ESTATE PLAN

**SOUTHEAST LOUISIANA URBAN
FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS
ST. TAMMANY PARISH, LOUISIANA**

**REAL ESTATE PLAN
SOUTHEAST LOUISIANA URBAN
FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS
ST. TAMMANY PARISH, LOUISIANA**

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Exhibit B:	Location Map / Tentatively Selected Plan Map
Exhibit C:	Baseline Cost Estimate
Exhibit D:	Non-Federal Sponsor Assessment of Acquisition Capability
Exhibit E:	Quality Control Plan Checklist

**REAL ESTATE PLAN
SOUTHEAST LOUISIANA URBAN
FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS
ST. TAMMANY PARISH, LOUISIANA**

1. **Name and Purpose** – This Real Estate Plan supports the Section 533(d) Report for the Southeast Louisiana Urban Flood Control Project, W-14 Canal Improvements, St. Tammany Parish, Louisiana study. This project was authorized by the Fiscal Year 1996 Appropriations Act, Public Law 104-46 (Section 108) and the Water Resources Development Act of 1996, Public Law 104-303 (Section 533). This report was prepared from the best available information; however, the material included here is for planning purposes only and is subject to change. The project is located in St. Tammany Parish, Louisiana. The purpose of the proposed action is to reduce the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin. The western portion of the Slidell area floods primarily from heavy rainfall and the inability of the existing drainage network to handle the resulting flows. The eastern portion of the Slidell area floods primarily from high water stages in the nearby Pearl River. Major flooding has occurred in the Slidell area due to heavy rainfall events, tropical storms, hurricanes, and high water stages on the Pearl River. The non-Federal sponsor will be the Coastal Protection and Restoration Authority (CPRA).

2. **LER Requirements** – The construction, operation and maintenance of this project will require these LER:

- 44.97 acres for detention ponds
- 46.0 acres for mitigation
- 33.23 acres of existing channel for clearing and snagging
- 17.10 acres of existing channel for channel improvement
- 5.21 acres for temporary construction right of way
- 2.0 acres for staging areas

The project involves an existing drainage channel known as the W-14 Canal. The channel appears to be an old tributary and has provided drainage for the City of Slidell for many years. Neither, the City or the Parish is able to determine definitively whether either party has real estate rights to the W-14 channel bed and banks. Louisiana Office of Public Works drawings dating back to the 1970's indicate a 130-foot right of way over the channel. However, no acquisition instruments have been found to indicate whether St. Tammany Parish or the City of Slidell own a fee interest or easements over the channel or the abutting channel banks.

If either St. Tammany Parish or the City of Slidell has been performing routine drainage channel maintenance and/or making drainage related improvements on the W-14 Canal

for at least 10 years without landowner objection, the entity performing the maintenance could claim a servitude over the canal under the St. Julien Doctrine (La. R.S. 19:14), if all the requisite legal requirements are satisfied. The St. Julien doctrine provides that when a political subdivision has in good faith exercised possession in good faith for ten years and has completed construction of improvements upon, under, or over privately owned immovable property; such owner shall be deemed to have waived his right to contest the necessity for the taking and to receive just compensation prior to the taking.

The statutory drainage servitude under La. R. S. 38:113 establishes a legal servitude for hundred feet on each side of a public drainage channel provided that: (1) the drainage canal was previously improved by the drainage district or adopted without prior improvement as a necessary part or extension to an improved drainage canal; (2) that the drainage canal is a public drainage canal; and (3) the canal was selected by the drainage district and recommended and approved by the state Office of Public Works. In the event there is a statutory servitude in favor of the city or parish, a third party cooperative endeavor agreement would be required between the party claiming the servitude and the NFS in order to give the NFS the use and benefit of the servitude rights.

At this time, neither the city nor the parish has indicated whether either will assert either the St. Julien Doctrine or the existence of a drainage channel maintenance servitude pursuant to La. R.S. 38:113. Consequently, for purposes of this REP, it will be assumed that permanent easements will be acquired over the existing channel and channel banks for accomplishing the project and for performing operation, maintenance, repair, replacement and rehabilitation by the NFS after construction completion. During project, engineering, and design phase, title will be searched and a determination as to the non-federal sponsor's interest will be made. The project could potentially impact as many as 201 landowners.

The work will consist of snagging and clearing approximately 2.1 miles of the existing W-14 Canal located between Interstate 12 and Fremaux Avenue. A perpetual channel improvement easement will be acquired over approximately 33.23 acres of existing channel and a temporary work area easement will be acquired over approximately 1.6 acres of vacant land adjacent to the channel for construction.

From Fremaux Avenue to Daney Street the channel will be cleared and snagged to remove vegetation that may impede the flow of water. All channel work will be performed within the existing channel banks. From Daney Street to Interstate 10, the project entails clearing and snagging as well as reshaping the channel. St. Tammany Parish performed this work in 2010. The project feature is included because CPRA may request credit based on the work already performed by the Parish. In addition, a temporary work area easement will be acquired over approximately 3.61 acres of vacant lands adjacent to the channel for temporary construction.

Project features include a 13.8-acre detention pond in an area located on the west side of U.S. Highway 11 near North Boulevard. The property is owned by the City of Slidell and is currently used as a detention pond. The project also includes the use of an

existing detention pond owned by the City of Slidell at Robert Boulevard. This detention pond will be enlarged from 19.6 acres to 31.3 acres. Fee excluding minerals will be acquired over approximately 4.1 acres of potential commercial property and 7.47 acres of potential residential property.

Four one-half acre staging areas are required for the project. Two staging areas are located within areas to be used as detention ponds; therefore, no additional interests need to be acquired. One staging area near Daney Street is located within the designated temporary work area for construction; therefore, no additional real estate interests are necessary. A temporary work area easement will be acquired over 0.5 acre for the staging area located on Florida Avenue.

Excavated material from reshaping the channels and debris from clearing and snagging the channel will be disposed on an approved landfill provided by the City of Slidell. A determination of whether the provision of the debris disposal areas will be creditable will be made during the PED phase. The project will include the replacement of the Florida Avenue Bridge. Bridge construction will be performed within existing road rights-of-way. Access to the work areas will be over public streets. No real estate interests need to be acquired for any of these project components.

Fish & Wildlife Service has selected the Blossman#1 site as the priority property for project mitigation. It is a 52-acre property of vacant land with trees. The Environmental Assessment has identified a need of 46 acres for mitigation; however, an acquisition of 46 acres leaves the property with an uneconomic remnant; therefore, the entire property will be purchased. The property is bounded by the Big Branch Marsh National Wildlife Refuge in St. Tammany Parish, Louisiana. The highest and best use of the property is determined to be for recreation use. This property will be acquired in Fee excluding minerals.

3. **Sponsor-Owned Land** – The CPRA does not own any real estate interests in the project boundary. However, the City of Slidell owns 19.6 acres of the 31.3 acres required for the Robert Boulevard Detention Pond. In addition, the City of Slidell owns the property where West Diversion Pond is constructed. The City will provide a right of entry to the non-federal sponsor for the project.

The ownership of the W-14 Canal is unclear. [See prior discussion above regarding potential statutory servitudes pursuant to La. R.S. 38:113 and La. R.S. 19:14 that may be available to either the city and/or the parish.] Neither the City of Slidell nor the Parish of St. Tammany has records to substantiate ownership. For much of the required right-of-way, the canal flows through a highly developed residential area composed of small lots. St. Tammany Parish has performed maintenance on the canal such as clearing and snagging throughout the years. The canal improvements that were performed in 2010 were done without the acquisition of real estate rights. Title search will be conducted prior to the construction of this project to determine what rights if any St. Tammany Parish has over the canal.

The Non Federal Sponsor will be required to obtain clear title to the channel and those sections of the channel banks that will be required for OMRR&R, before construction of this project can begin. For the purpose of this report, we have assumed that the Non Federal Sponsor will have to acquire a new interest over all of the channel and in all of the temporary work areas adjacent to the channel. These assumptions are based on information available as of the date of this document. Additional investigation during PED phase could substantially change real estate acquisition requirements. .

Presently we do not have sufficient information to provide details pertaining to the extent of the NFS crediting issues. We do not have sufficient documentation of provisions concerning the crediting issues nor the impact pertaining to any crediting issues.

4. **Estates** – The project will require acquisition of three standard estates: (a) Fee Excluding Minerals (with Restriction on Use of the Surface), (b) Perpetual Channel Improvement Easement, and (c) Temporary Work Area Easement for three years. Copies of the estates are included as Exhibit A.

5. **Existing Federal Projects** – There are no existing Federal projects within the construction area. (See next paragraph.)

6. **Federally Owned Land** –The Federal Government does not own any interest in the project area.

7. **Navigation Servitude** – The navigation servitude is the “dominant right of the Government under the Commerce Clause of the U.S. Constitution to use, control and regulate the navigable waters of the United States and the submerged lands thereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high water mark. In non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the ordinary high water mark.”

The Navigation Servitude is not applicable to this project. The subject canal is not navigable nor is it used in connection with commerce.

8. **Project Map** – See Exhibit B.

9. **Induced Flooding** – The construction of this project will not induce any flooding.

10. **Baseline Cost Estimate for Real Estate** – The total estimated real estate cost for this project is \$7,413,000. This includes LER’s, administrative costs, and contingency. The costs of LERs were developed in a gross appraisal, which was reviewed and approved at the District level. A Chart of Accounts is included as Exhibit C.

11. **Relocation Assistance** – The sponsor will comply with the requirements of P.L. 91-646 concerning only one improvement impacted by the project, a shed, which is part of a residential ownership. Under Title II of the Uniform Relocation Assistance and Real

Property Acquisition Policies Act of 1970, Public Law 91-646, as amended, this property qualifies for relocation assistance advisory services and reimbursement of moving expenses for personal property.

12. **Timber/Mineral/Row Crop Activity** – There are no crops, minerals, or merchantable timber affected by this project.

13. **Non-Federal Sponsor Assessment** –The Non Federal Sponsor for the construction of this project will be the CPRA. The sponsor is responsible for providing all lands, easements, and rights-of-ways, and performing or ensuring the performance of all relocations determined by the Federal Government to be necessary for the construction, operation, and maintenance of the project. Since CPRA does not have quick take authority, but has condemnation authority, and St. Tammany Parish does have quick take authority, they will collaborate to perform such an acquisition, if deemed necessary. Therefore, a Capability Assessment of the Non-Federal Sponsor’s Acquisition Experience has been prepared for CPRA and St. Tammany Parish and is contained in Exhibit D. CPRA and St. Tammany Parish are deemed to have sufficient authority to acquire and to hold the real estate necessary for construction of this project. Therefore, the sponsor is deemed fully capable of fulfilling its duties under the Project Partnership Agreement. The NFS has been advised of the URA requirements and requirements for documenting expenses for credit.

In conducting acquisition activities, the Non-Federal Sponsor will comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended.

14. **Zoning Ordinances** – No application or enactment of zoning ordinances has been proposed in lieu of, or to facilitate, acquisition in connection with this project.

15. **Acquisition Schedule** – The following schedule is based on acquiring real estate rights from 201 landowners. If the number of landowners is substantially different, this may affect the schedule. This schedule shows the duration of each event. The total duration of acquisition is estimated to be 4½ to 5 years, which includes time required for condemnation of properties that cannot be acquired amicably.

1) Request right of entry from non-Federal sponsor	1 month
2) Non-Federal sponsor obtains mapping information	6 months
3) Non-Federal sponsor obtains title information	12 months
4) Non-Federal sponsor obtains appraisals (can be concurrent w/ title)	12 months
5) Non-Federal sponsor negotiates acquisition	24 months
6) Non-Federal sponsor issues right of entry	½ month

7) Certification of right-of-way	½ month
8) If condemnation is necessary	12-18 months
9) Certification of right of entry after review of condemnation	½ month

16. **Facility and Utility Relocations** – A Preliminary Attorney’s Investigation and Report of Compensable Interest is being prepared for facilities and utilities, which require relocation. This report was not complete by the required deadline for submission of the REP; therefore, this REP cannot address the compensability status of the utility relocations. A final Attorney’s Investigation and Report of Compensable Interest will be completed prior to initiation of acquisition activities.

As of the date of this REP, Engineering Division has identified the following utilities/facilities as being impacted by the project:

1. **Cleco- 4 power poles, 1 powerline, 2 guy poles and 8 guy wires.**
2. **Charter- 4 overhead cables both temporary and permanent, 1 overhead wire bundle and 1 underground cable.**
3. **AT&T/Bellsouth –a phone conduit at 2 locations, 1 overhead cable and 1 underground cable.**
4. **Atmos – removal and installation of 1 gas main.**
5. **City of Slidell- replace 3 water lines and provide temporary water service, 1 new sewer line and installation and removal of 1 main.**
6. **USGS – removal and reset of a gaging station.**
7. **Florida Bridge- replace with a wider bridge.**

Please refer to the Relocations Section of the Engineering Appendix for a complete listing and details regarding the impacted utilities. Any conclusion or categorization contained in this report that an item is a utility or facility relocation to be performed by the non-federal sponsor as part of its LER responsibilities is preliminary only. The government will make a final determination of the relocations necessary for the construction, operation, or maintenance of the project after further analysis, completion, and approval of final attorney’s opinions of compensability for each of the impacted utilities and facilities.

The Non Federal Sponsor will coordinate the relocation of facilities and utilities prior to issuing right of entry for construction.

17. **Environmental Issues** –A phase I Environmental Site Assessment (ESA) (HTRW-08-33) was completed 22 August 2008 by Gulf Engineers and Consultants (GEC). The Phase I ESA indicated that there was a possibility of contamination in some canal sediments; therefore, a Limited Phase II ESA (HTRW-08-37), dated November 2008, was conducted. Some contaminants were found, but they are not deemed to be HTRW.

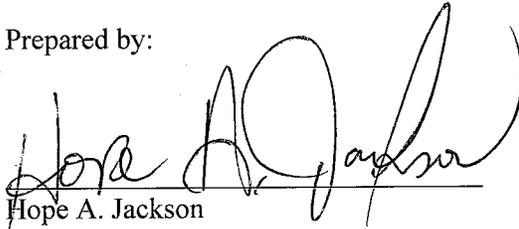
USACE-MVN personnel made a field inspection of the W-14 Canal on 12 September 2011. During PED phase an updated field inspection will be completed. During the last inspection date mentioned above, there were no signs of HTRW found. Other than the probable contamination of canal sediments, there were no Recognized Environmental Conditions (RECs) identified. The probability is low of encountering HTRW during the course of the canal improvement work. There is no further investigation of HTRW related to the proposed project, and the project may proceed as scheduled.

18. **Landowner Attitude** – Landowner meetings have not been conducted; therefore, landowners’ attitudes are unknown at this time.

19. **Sponsor Notification** – By letter dated 4 October 2004, the City of Slidell, which was once contemplated to serve as the non-Federal sponsor, was notified of the risks associated with right-of-way acquisition prior the execution of a PPA and the Government’s formal notice to proceed. By letter dated 5 February 2010, St. Tammany Parish, who was also at one time going to serve as the non-Federal sponsor, was notified of the risks associated with right-of-way acquisition prior to the execution of a PPA. Since that time, legislation has been enacted requiring that CPRA (as opposed to the city or parish) serve as the Non-Federal Sponsor for this project. The CPRA signed a letter of intent in January 2012 agreeing to serve as NFS and acknowledging the risks associated therewith. .

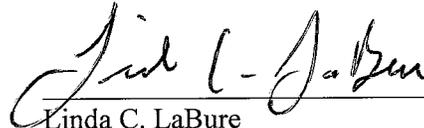
20. **Other Relevant Real Estate Issues** - None

Prepared by:



Hope A. Jackson
Realty Specialist
Real Estate Region South Division
April 4, 2012

Reviewed by:



Linda C. LaBure
New Orleans District Real Estate Chief
Real Estate Region South Division
April 4, 2012

EXHIBIT A

ESTATES

FEE EXCLUDING MINERALS (With Restriction on Use of the Surface)

The fee simple title to the land, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; excepting and excluding all oil and gas, in and under said land and all appurtenant rights for the exploration, development, production and removal of said oil and gas, but without the right to enter upon or over the surface of said land for the for the purpose of exploration, development, production and removal therefrom of said oil and gas.

CHANNEL IMPROVEMENT EASEMENT

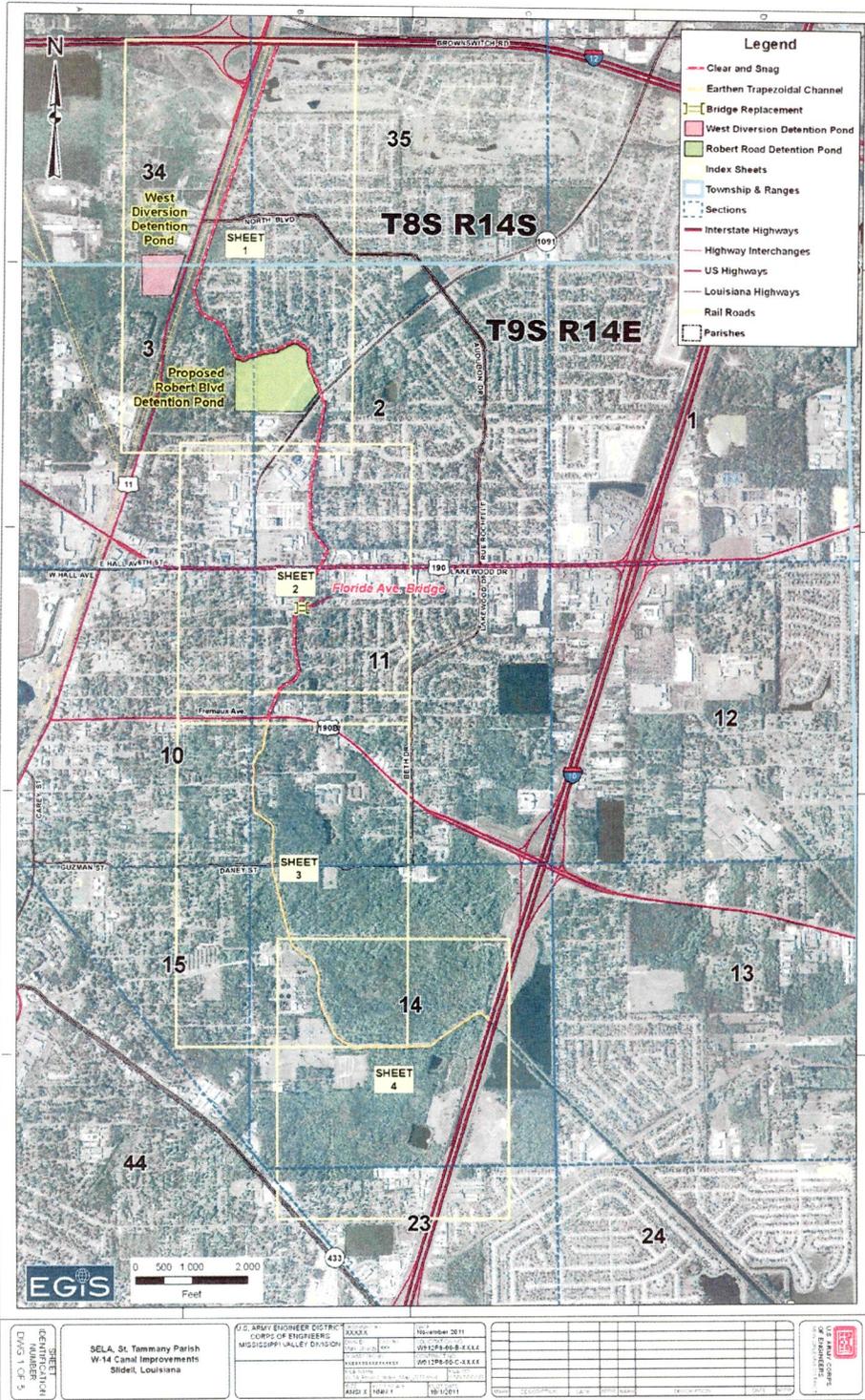
A perpetual and assignable right and easement to construct, operate, and maintain channel improvement works on, over and across (the land described in Schedule A) (Tracts Nos. _____, _____ and _____) for the purposes as authorized by the Act of Congress approved _____, including the right to clear, cut, fell, remove and dispose of any and all timber, trees, underbrush, buildings, improvements and/or other obstructions therefrom; to excavate: dredge, cut away, and remove any or all of said land and to place thereon dredge or spoil material; and for such other purposes as may be required in connection with said work of improvement; reserving, however, to the owners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

TEMPORARY WORK AREA EASEMENT

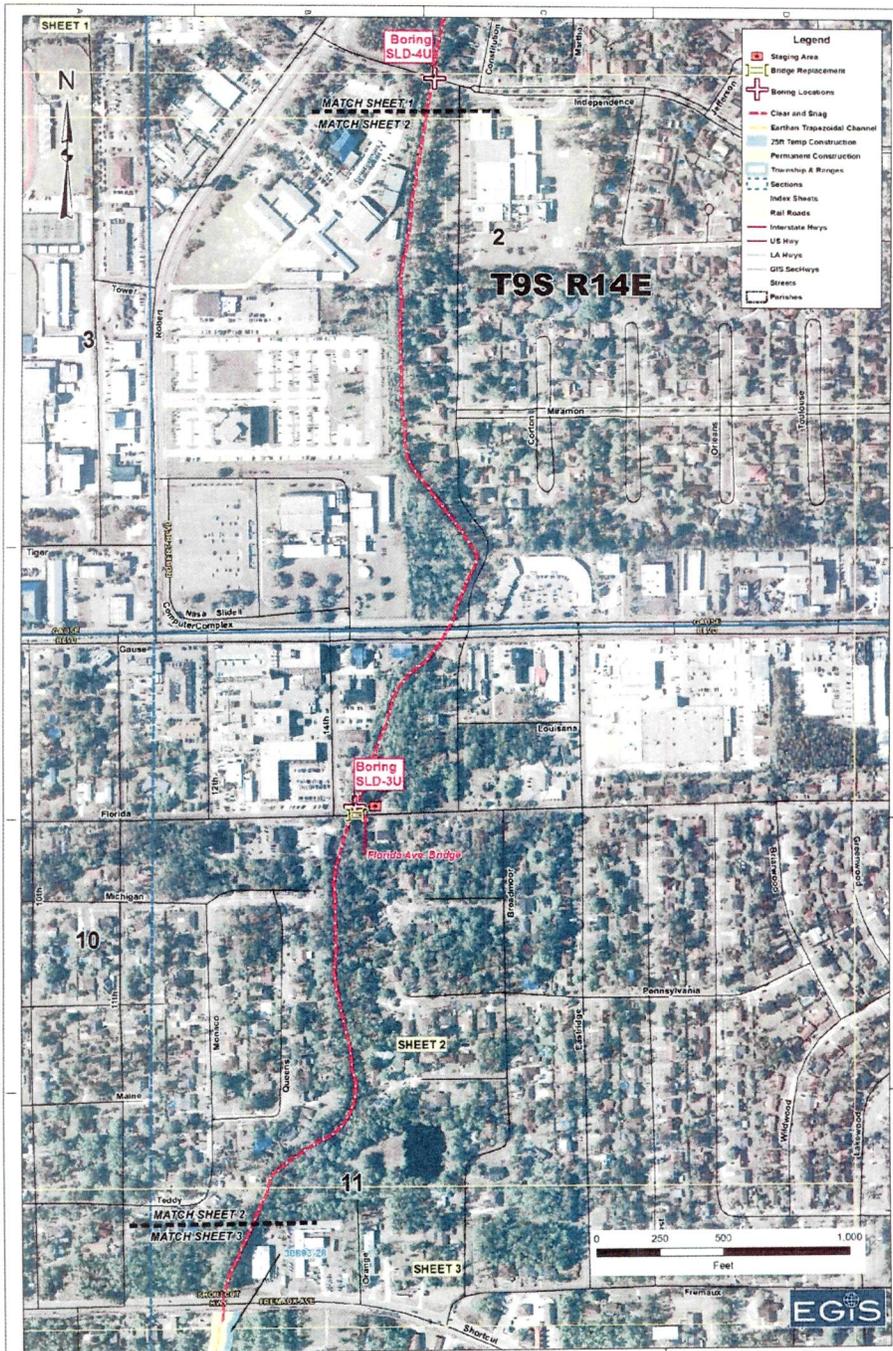
A temporary easement and right-of-way in, on, over and across the land, for a period not to exceed three (3) years, beginning with date possession of the land is granted to the United States, for use by the United States, its representatives, agents, and contractors as a work area, including the right to deposit fill, spoil and waste material thereon, move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

EXHIBIT B

PROJECT MAP



Job No. EGIS-08-123



SHEET IDENTIFICATION DWG 3 OF 5	SELA, St Tammany Parish W-14 Canal Improvements Sheet, Louisiana	U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS MISSISSIPPI VALLEY DIVISION	PROJECT NO.	DATE	JOB NO.	SCALE	SHEET NO.	TOTAL SHEETS	
			PROJECT NAME	DATE					
		PROJECT NO. 174		DATE 11/15/2011		JOB NO. EGIS-08-123		SCALE	
		PROJECT NAME		DATE		JOB NO.		SCALE	

Job No. EGIS-08-123



Job No. EGIS-08-123



SHEET IDENTIFICATION DWG 5 OF 5	SHELA, 51 Tammany Parish W-14 Canal Improvements Slidell, Louisiana	C.S. ARIST ENGINEER DISTRICT BOARD OF ENGINEERS MISSISSIPPI VALLEY DIVISION		PROJECT NO. 000000 PROJECT NAME W-14 Canal Improvements SHEET NO. 51 OF 51 DATE 11/15/2011	DATE November 2011 DRAWN BY J. J. [unreadable] CHECKED BY [unreadable] DESIGNED BY [unreadable]
		PROJECT LOCATION T9S R14E S23 SLIDELL, LA		PROJECT NO. 000000 PROJECT NAME W-14 Canal Improvements SHEET NO. 51 OF 51 DATE 11/15/2011	DATE November 2011 DRAWN BY J. J. [unreadable] CHECKED BY [unreadable] DESIGNED BY [unreadable]

Job No EGIS-08-123

EXHIBIT C

CHART OF ACCOUNTS

SELA W-14 Canal
Real Estate Chart of Accounts
March 2012

01K40	REVIEW OF LS								
01N00	FACILITY/UTILITY RELOCATIONS								
01R	REAL ESTATE PAYMENTS								
01R1	LAND PAYMENTS								
01R1A	BY GOVERNMENT								
01R1B	BY LS	824,000							
01R1C	BY GOVT ON BEHALF OF LS								
01R1D	REVIEW OF LS		206,000	1,030,000					
01R2	PL 91-646 ASSISTANCE PAYMENTS								
01R2A	BY GOVERNMENT								
01R2B	BY LS	2,000							
01R2C	BY GOVT ON BEHALF OF LS								
01R2D	REVIEW OF LS		500	2,500					
01R3	DAMAGE PAYMENTS								
01R3A	BY GOVERNMENT								
01R3B	BY LS								
01R3C	BY GOVT ON BEHALF OF LS								
01R3D	REVIEW OF LS								
01R9	OTHER								
01T	LERRD CREDITING								
01T10	LAND PAYMENTS								
01T20	ADMINISTRATIVE COSTS								
01T30	PL 91-646 ASSISTANCE	50,000	12,824	62,824					
01T40	ALL OTHER								
02	RELOCATIONS								
02100	RELOCATION OF ROADS (INCLUDING BRIDGES)								
02200	RELOCATIONS OF RAILROADS (INCLUDING BRIDGES)								
02300	RELOCATION OF CEMETERIES, UTILITIES AND STRUCTURES								

EXHIBIT D

**ASSESSMENT
OF
NON-FEDERAL
SPONSOR'S LAND
ACQUISITION
EXPERIENCE**

**ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY
Coastal Protection Restoration Authority (CPRA)
through the
Office of Coastal Protection and Restoration (OCPR)**

I. Legal Authority:

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? **YES, if property title is required for the purposes of this project.**
- b. Does the sponsor have the power of eminent domain for this project? **YES – But limited to expropriation.**
- c. Does the sponsor have "quick-take" authority for this project?

NO, Although the sponsor does not have quick take authority, if this should be needed for the project, the sponsor may partner with a Levee District or Parish Government which has that authority (Act 225 RS38:301.1 and Act 320) if they agree.

- d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary? **NO**
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? **Unknown**

II. Human Resource Requirements:

- a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? **NO**
- b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? **N/A**

- c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? **YES**
- d. Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule?

Not at this time. CPRA is presently under development. It is expected that the staff will continue to grow in the upcoming months/years, provided sufficient budget & proper legal authorities.

- e. Can the sponsor obtain contractor support, if required in a timely fashion? **Yes. Contract are in place now.**

Will the sponsor likely request USACE assistance in acquiring real estate?

It is not likely that the sponsor will request assistance.

f.

III. Other Project Variables:

- a. Will the sponsor's staff be located within reasonable proximity to the project site? **YES**
- b. Has the sponsor approved the project/real estate schedule/milestones?

At the feasibility level there are too many unknowns to develop a definite project schedule. Once project designs are finalized, the sponsor will be requested to provide an acquisition schedule.

IV. Overall Assessment:

- a. Has the sponsor performed satisfactorily on other USACE projects? **YES**
- b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/insufficiently capable.

Fully capable

V. Coordination:

a. Has this assessment been coordinated with the sponsor? **YES**

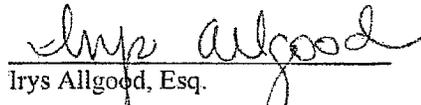
b. Does the sponsor concur with this assessment? **YES**

Prepared by:


Karen E. Vance

Realty Specialist, USACE

Approved by:

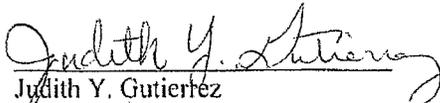
 12-10-10
Irys Allgood, Esq.

Counsel & Chief of Real Estate &

Land Rights Division

Office of Coastal Protection & Restoration

Approved by:


Judith Y. Gutierrez
Chief, Appraisal & Planning Branch
USACE

**ASSESSMENT OF NON-FEDERAL SPONSOR'S
REAL ESTATE ACQUISITION CAPABILITY
(St. Tammany Parish)**

I. Legal Authority:

- a. Does the sponsor have legal authority to acquire and hold title to real property for project purposes? (yes/no)
- b. Does the sponsor have the power of eminent domain for this project? (yes/no)
- c. Does the sponsor have "quick-take" authority for this project? (yes/no)
- d. Are any of the lands/interests in land required for the project located outside the sponsor's political boundary (yes/no)
- e. Are any of the lands/interests in land required for the project owned by an entity whose property the sponsor cannot condemn? (yes/no)

II. Human Resource Requirements:

- a. Will the sponsor's in-house staff require training to become familiar with the real estate requirements of Federal projects including P.L. 91-646, as amended? (yes/no)
- b. If the answer to II.a. is "yes," has a reasonable plan been developed to provide such training? (yes/no)
- c. Does the sponsor's in-house staff have sufficient real estate acquisition experience to meet its responsibilities for the project? (yes/no)
- d. Is the sponsor's projected in-house staffing level sufficient considering its other workload, if any, and the project schedule? (yes/no)

- e. Can the sponsor obtain contractor support, if required in a timely fashion? (yes/no)
- f. Will the sponsor likely request USACE assistance in acquiring real estate? (yes/no) - If yes provide description)

III. Other Project Variables:

- a. Will the sponsor's staff be located within reasonable proximity to the project site? (yes/no)
- b. Has the sponsor approved the project/real estate schedule/milestones? (yes/no)

IV. Overall Assessment:

- a. Has the sponsor performed satisfactorily on other USACE projects? (yes/no/not applicable)

Sponsor has not participated as NFS in other USACE projects.

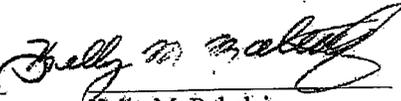
- b. With regard to this project, the sponsor is anticipated to be: highly capable/fully capable/moderately capable/marginally capable/insufficiently capable. (If sponsor is believed to be "insufficiently capable," provide explanation.)

V. Coordination:

- a. Has this assessment been coordinated with the sponsor? (yes/no)
- b. Does the sponsor concur with this assessment? (yes/no)

Prepared By:

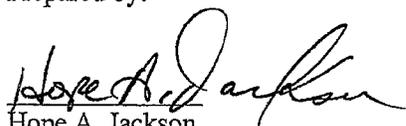

Dawn M. Williams
Property Coordinator


Kelly M. Rabalais
Executive Counsel
Attorney Advisor

Approved By:


Linda Labure
Chief Real Estate Division

Prepared by:

A handwritten signature in black ink, appearing to read "Hope A. Jackson". The signature is written in a cursive style with a large, looping initial "H".

Hope A. Jackson
Realty Specialist

EXHIBIT E

MVD CHECKLIST

EXHIBIT E

QUALITY CONTROL PLAN CHECKLIST

**Real Estate Plans
And other similar Feasibility-Level Real Estate Planning Documents**

ER 405-1-12, Section 12-16, Real Estate Handbook, 1 May 1998

A Real Estate Plan (REP) is prepared in support of a decision document for full-Federal or cost shared specifically authorized or continuing authority projects. It identifies and describes lands, easements and rights-of-way (LER) required for the construction, operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of a proposed project including requirements for mitigation, relocations, borrow material, and dredged or excavated material disposal. It also identifies and describes facility/utility relocations, LER value, and the acquisition process. The REP does not just cover LER to be acquired by the non-Federal sponsor (NFS) or Government. The report covers all LER needed for the project, including LER already owned by the NFS, Federal Government, other public entities, or subject to the navigation servitude.

The REP must contain a detailed discussion of the following 20 topics, as set out in Section 12-16 of the ER, including sufficient description of the rationale supporting each conclusion presented. If a topic is not applicable to the project, this should be stated in the REP. The pages of a REP should be numbered.

PROJECT: **SOUTHEAST LOUISIANA URBAN FLOOD
CONTROL PROJECT, W-14 CANAL IMPROVEMENTS,
ST. TAMMANY PARISH, LOUISIANA**

TITLE: **REAL ESTATE PLAN**

Date of REP: **April 4, 2012**

1. **Purpose of the REP.**
 - a. Describe the purpose of the REP in relation to the project document that it supports.
 - b. Describe the project for the Real Estate reviewer.
 - c. Describe any previous REPs for the project.

2. **Describe LER.**
 - a. Account for all lands, easements, and rights-of-way underlying and required for the construction, OMRR&R of the project, including mitigation, relocations, borrow material and dredged or excavated material disposal, whether or not it will need to be acquired or will be credited to the NFS.
 - b. Provide description of total LER required for each project purpose and feature.
 - c. Include LER already owned by the Government, the NFS and within the navigation servitude.

- d. Show acreage, estates, number of tracts and ownerships, and estimated value.
- e. Break down total acreage into fee and the various types and durations of easements.
- f. Break down acreage by Government, NFS, other public entity, and private ownership, and lands within the navigation servitude.

3. **NFS-Owned LER.**

- a. Describe NFS-owned acreage and interest and whether or not it is sufficient and available for project requirements.
- b. Discuss any crediting issues and describe NFS views on such issues.

4. Include any proposed **Non-Standard Estates.**

- a. Use Standard Estates where possible.
- b. Non-standard estates must be approved by HQ to assure they meet DOJ standards for use in condemnations.
- c. Provide justification for use of the proposed non-standard estates.
- d. Request approval of the non-standard estates as part of document approval.
- e. If the document is to be approved at MSC level, the District must seek approval of the non-standard estate by separate request to HQ. This should be stated in the REP.
- f. Exception to HQ approval is District Chiefs of RE approval of non-standard estate if it serves intended project purposed, substantially conforms with and does not materially deviate from the standard estates found in the RE Handbook, and does not increase cost or potential liability to the Government. A copy of this approval should be included in the REP. (See Section 12-10c. of RE 405-1-12)
- g. Although estates are discussed generally in topic 2, it is a good idea to also state in this section which standard estates are to be acquired and attach a copy as an appendix. The duration of any temporary estates should be stated.

5. **Existing Federal Projects.**

- a. Discuss whether there is any existing Federal project that lies fully or partially within LER required for the project.
- b. Describe the existing project, all previously-provided interests that are to be included in the current project, and identify the sponsor.
- c. Interest in land provided as an item of local cooperation for a previous Federal project is not eligible for credit.
- d. Additional interest in the same land is eligible for credit.

6. **Federally-Owned Lands**

- a. Discuss whether there is any Federally owned land included within the LER required for the project.
- b. Describe the acreage and interest owned by the Government.
- c. Provide description of the views of the local agency representatives toward use of the land for the project and issues raised by the requirement for this land.

7. **Navigation Servitude.**

- a. Identify LER required for the project that lies below the Ordinary High Water Mark, or Mean High Water Mark, as the case may be, of a navigable watercourse.

- b. Discuss whether navigation servitude is available
- c. Will it be exercised for project purposes? Discuss why or why not.
- d. Lands over which the navigation servitude is exercised are not to be acquired nor eligible for credit for a Federal navigation or flood control project or other project to which a navigation nexus can be shown.
- e. See paragraph 12-7 of ER 405-1-12.

8. **Map**

- a. An aid to understanding
- b. Clearly depicting project area and tracts required, including existing LER, LER to be acquired, and lands within the navigation servitude.
- c. Depicts significant utilities and facilities to be relocated, any known or potential HTRW lands.

9. **Induced Flooding** can create a requirement for real estate acquisition.

- a. Discuss whether there will be flooding induced by the construction and OMRR&R of the project.
- b. If reasonably anticipated, describe nature, extent and whether additional acquisition of LER must or should occur.
- c. Physical Takings Analysis (separate from the REP) must be done if significant induced flooding anticipated considering depth, frequency, duration, and extent of induced flooding.
- d. Summarize findings of Takings Analysis in REP. Does it rise to the level of a taking for which just compensation is owed?

10. **Baseline Cost Estimate** as described in paragraph 12-18.

- a. Provides information for the project cost estimates.
- b. Gross Appraisal includes the fair market value of all lands required for project construction and OMRR&R.
- c. PL 91-646 costs
- d. Incidental acquisition costs
- e. Incremental real estate costs discussed/supported.
- f. Is Gross Appraisal current? Does Gross Appraisal need to be updated due to changes in project LER requirements or time since report was prepared?

11. **Relocation Assistance Benefits** Anticipated.

- a. Number of persons, farms, and businesses to be displaced and estimated cost of moving and reestablishment.
- b. Availability of replacement housing for owners/tenants
- c. Need for Last Resort Housing benefits
- d. Real Estate closing costs
- e. See current 49 CFR Part 24

12. **Mineral Activity**.

- a. Description of present or anticipated mineral activity in vicinity that may affect construction, OMRR&R of project.

- b. Recommendation, including rationale, regarding acquisition of mineral rights or interest, including oil or gas.
- c. Discuss other surface or subsurface interests/timber harvesting activity
- d. Discuss effect of outstanding 3rd party mineral interests.
- e. Does estate properly address mineral rights in relation to the project?

13. **NFS Assessment** _____

- a. Assessment of legal and professional capability and experience to acquire and provide LER for construction, OMRR&R of the Project.
- b. Condemnation authority
- c. Quick-take capability
- d. NFS advised of URA requirements
- e. NFS advised of requirements for documenting expenses for credit.
- f. If proposed that Government will acquire project LER on behalf of NFS, fully explain the reasons for the Government performing work.
- g. A copy of the signed and dated Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability (Appendix 12-E) is attached to the REP.

14. **Zoning** in Lieu of Acquisition _____

- a. Discuss type and intended purpose
- b. Determine whether the proposed zoning proposal would amount to a taking for which compensation will be due.

15. **Schedule** _____

- a. Reasonable and detailed Schedule of land acquisition milestones, including LER certification.
- b. Dates mutually agreed upon by Real Estate, PM, and NFS. _____

16. **Facility or Utility Relocations** _____

- a. Describe the relocations, identity of owners, purpose of facilities/utilities, whether owners have compensable real property interest.
- b. A synopsis of the findings of the Preliminary Attorney's Investigation and Report of Compensable Interest is included in the REP as well as statements required by Sections 12-17c.(5) and (6).
- c. Erroneous determinations can affect the accuracy of the project cost estimate and can confuse Congressional authorization.
- d. Eligibility for substitute facility
 - 1. Project impact
 - 2. Compensable interest
 - 3. Public utility or facility
 - 4. Duty to replace
 - 5. Fair market value too difficult to determine or its application would result in an injustice to the landowner or the public.
- e. See Sections 12-8, 12-17, and 12-22 of ER 405-1-12.

17. **HTRW** and Other Environmental Considerations _____

- a. Discussion the impacts on the Real Estate acquisition process and LER value estimate due to known or suspected presence of contaminants.
- b. Status of District's investigation of contaminants.
- c. Are contaminants regulated under CERCLA, other statues, or State law?
- d. Is clean-up or other response required of non-CERCLA regulated material?
- e. If cost share, who is responsible for performing and paying cost of work?
- f. Status of NEPA and NHPA compliances
- g. See ER 1165-2-132, Hazardous, Toxic, and Radioactive Waste (HTRW) Guidance for Civil Works Projects.

18. **Landowner Attitude.** √

- a. Is there support, apathy, or opposition toward the project?
- b. Discuss any landowner concerns on issues such as condemnation, willing seller provisions, estates, acreages, etc.?

19. A statement that the **NFS has been notified in writing about the risks of acquiring LER before the execution of the PPA.** If not applicable, so state. N/A

20. **Other Relevant Real Estate Issues.** Anything material to the understanding of the RE aspects of the project. √

A copy of the completed Checklist is attached to the REP. √
 (Draft REPs must contain a draft checklist and draft Technical Review Guide)

I have prepared and thoroughly reviewed the REP and all information, as required by Section 12-16 of ER 405-1-12, is contained in the Plan.

Hope A. Jackson
 Preparer

April 4, 2012
 Date

A copy of the Real Estate Internal Technical Review Guide for Civil Works Decision Documents is attached and signed by me as the Reviewer

Huey L. Maxwell
 RE Internal Technical Reviewer

4/4/12
 Date

The REP has been signed and dated by the Preparer and the District Chief of Real Estate. √

**SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
ST. TAMMANY PARISH, LOUISIANA
SECTION 533 (d) REPORT
W-14 CANAL IMPROVEMENTS PROJECT**

APPENDIX E

TECHNICAL REVIEW SUMMARY

APPENDIX E

TECHNICAL REVIEW SUMMARY

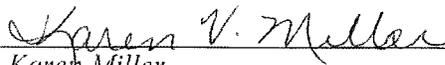
- 1. Agency Technical Review Certification and DrChecks Comments**
- 2. Cost Agency Technical Review Certification Statement**
- 3. MVN District Quality Review DrChecks Comments**
- 4. Supplemental Environmental Assessment #409A Agency Technical Review**

1. Agency Technical Review Certification and DrChecks Comments

STATEMENT OF TECHNICAL REVIEW FOR DECISION DOCUMENTS

COMPLETION OF AGENCY TECHNICAL REVIEW

The Agency Technical Review (ATR) has been completed for the Southeast Louisiana Urban Flood Control Project W-14 Canal Improvements Section 533(d) Report and Environmental Assessment. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-209. During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing US Army Corps of Engineers policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrCheckssm.



Karen Miller

Agency Technical Review Team Lead

CELRH-PD-F

3/16/12

Date



Donna Urban

CEMVN Project Manager

3/23/12

Date

Comment Report: All Comments

Project: SELA W-14 Canal Improvement Project

Review: ATR - DRAFT 533d Report - 17 Dec 2011

Displaying 76 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
4426195	Geotechnical	n/a'	n/a	n/a

1. Volume 2, Appendix C, Executive Summary a. Review Concern: Inaccurate description of improvements b. Basis for Concern: The second paragraph of the Executive Summary states that the Robert Boulevard Detention Pond will be provided with a (single) lateral weir. The remainder of the report discusses the need for 3 weirs. c. Significance of Concern: Clarity of Report d. Action Needed to Resolve: Correct the Executive summary to show 3 weirs

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Concurred

Executive Summary has been revised to reflect 3 weirs.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 28-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 29-Feb-12

Current Comment Status: **Comment Closed**

4426199	Geotechnical	n/a'	n/a	n/a
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2. General Comment, Volume 2, Appendix C, Geotechnical Investigation a. Review Concern: Lack of sufficient geotechnical analysis and/or discussion of assumptions to verify the project design b. Basis for the Concern: Preliminary slope stability analyses for the channel design, preliminary foundation design for the bridge abutments (concrete piling and sheet piling) etc. and/or detailed discussions relative to the geotechnical assumptions used in the project design have not been presented which justify the project design and are the basis for the assumptions in the cost analysis. c. Significance of the Concern: There could be a major impact on the design and costs of the design d. Action Needed to Resolve: Based on ER 1110-2-1150 a Feasibility Report should provide preliminary analyses to justify the project design and the assumptions used in the cost analysis. These should include slope stability analyses relative to the channel design, concrete piling analysis at the bridge, sheet piling analysis for the bridge abutment and discussions of the geotechnical assumptions relative to excavations, etc. If analyses have not been performed then detailed discussions of the assumptions used in the designs should be presented to verify the project plan and foundation designs. Also, discussions relative to embankment requirements, backfill requirements (types and compaction), unwatering/dewatering requirements, bedding and geotextile requirements, etc. should also be presented.

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Non-concurred

Due to the time-frame to complete our comments, Engineering will not be able to add this additional information at this time but when this project is at design phase additional details and this information will be provided.

Submitted By: [Hope Jackson](#) (504-862-2891) Submitted On: 29-Feb-12

1-1 Backcheck Recommendation Close Comment

I understand the timeframe and will close the comment but the geotechnical portion of the report should contain enough information to justify the cost estimate. A short discussion on why 1V on 3H channel slopes were assumed, why riprap is needed, why the piling was assumed to be at a certain depth, etc. would help to clarify the report and justify the cost estimate.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 02-Mar-12

2-0 Evaluation Concurred

Stability analysis had been added to Appendix C. The other items will be considered in the next phase of design.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 02-Mar-12

2-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4426200	Geotechnical	n/a'	n/a	n/a
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3. Volume 2, Appendix C, Geotechnical Investigation, Project Design, W-14 Canal Improvements Design, Page 76 a. Review Concern: Inaccurate information presented b. Basis for the Concern: In this paragraph it states that a seepage analysis was performed and presented in Annex 3. However no analysis was presented in the Annex. Also, what is the purpose of the seepage analysis? c. Significance of the Concern: Accuracy and clarity of the report d. Action Needed to Resolve: Present the seepage analysis if performed and discuss its relevance to the project.

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Concurred

Sentence regarding seepage analysis had been deleted as it refers to the 30' & 45' concrete channels that were to be constructed in the \$220M project.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4426203 Geotechnical n/a' n/a n/a

4. Volume 2, Appendix C, Geotechnical Investigation, Project Design, Bridge Replacement Design, Page 76 a. Review Concern: Clarity on the type of foundation required for the bridge b. Basis for the Concern: It states that the laboratory test results were used in the design of the Florida Street Bridge but no design is presented. In paragraph 2 of page 89 it states that the preferred bridge abutment design will consist of sheet piling designed to support the channel walls and the piling loads. However, the cost estimate in Annex 9 of the report does not include any costs relative to sheet piling. c. Significance of Concern: Clarity and accuracy of the report d. Action Needed to Resolve: Provide analyses and/or detailed discussion on the type of bridge foundation and ensure the costs presented represent the design.

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Concurred

Pile design will be considered in the next phase of design.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4426204 Geotechnical n/a' n/a n/a

5. Volume 2, Annex 3 and Annex 4 a. Review concern: Clarity of information presented in Annex 3 and Annex 4 b. Basis for the Concern: Only 3 of the boring logs are presented in Annex 3, but all of the boring logs are presented in Annex 4. c. Significance of Report: Clarity of geotechnical information presented d. Action Needed to Resolve: All of the boring logs should be presented in Annex 3 and removed from Annex 4

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Concurred

All boring logs have been deleted from Annex 4 and have been added to Annex 3.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 25-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 29-Feb-12

Current Comment Status: **Comment Closed**

4426205 Geotechnical n/a' n/a n/a

6. Volume 2, Annex 5, Cross Sections, Plates C-2.6 and C-2.7 a. Review concern: Potential instability of channel slopes b. Basis for the Concern: In the cross sections presented for the feature of work which has already been constructed (Daney Street to Interstate 10) there are several sections where due to the alignment embankment fill has been placed at the toe of the slope in order to construct the 1V on 3H slopes c. Significance of Concern: This practice is risky relative to future stability of the slopes. My experience has been that this material is not adequately compacted and will soon scour out unless additional protection such as riprap is provided. d. Action Needed to Resolve: Ensure that the alignment for the portion of the channel work which has not been constructed (Fremaux Avenue to Daney Street) is set such that embankment fill is not placed within the channel section. If it can't be avoided consider using additional protection such as riprap to provide stability against future scour.

Submitted By: [Ronald Smith](#) (901-544-3381). Submitted On: 13-Feb-12

1-0 Evaluation Concurred

Comment will be considered in next phase of design.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Ronald Smith](#) (901-544-3381) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4442712	Civil	n/a'	n/a	n/a
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([Document Reference: Volume 1](#))

Ref: Volume 1 Main Report and E.A. Page 52. Under "Canals". Interstate 12 to Fremaux Avenue: Improvements to the existing canal will include the clearing and snagging of the existing canal to remove unwanted vegetation, trees, and debris (approx 11,135 ft). Will this Item for Clearing over 2 miles of existing canals, entail removal of any significant size trees or debris? Should an additional Line Item be added to account for areas of unique Clearing of Specific large items?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Removal of items of significant size will not be encountered, therefore, an additional line item is will not be required.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 24-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 27-Feb-12

Current Comment Status: **Comment Closed**

4442717	Civil	n/a'	n/a	n/a
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(Document Reference: Volume 1)

Ref: Volume 1 Main Report and E.A. Pg 52, under "Canals". Fremaux Avenue to Daney Street: Improvements to the canal will include the reshaping of the existing canal to a trapezoidal section having a 10-ft bottom width with 3H:1V side slopes from the downstream side of Fremaux Avenue to the upstream side of the Daney Street Bridge (approx 2,960 ft). Will the relatively flat proposed side slopes have any negative effect on commercial or residential properties (houses or other structures) along the top of the banks? Was this effect accounted for in property or relocations costs?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The current design of the project is preliminary. Once the 533d report is approved and design funds appropriated, new surveys will be performed. The real estate plan developed for the project has taken into account that there be may landowners affected by the project. Costs have been included for property and relocations costs.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4442727	Civil	n/a'	n/a	n/a
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(Document Reference: Volume 1 and 2)

Ref: Vol 1 Main Report and E.A. Pg 53 and Volume 2 Real Estate Plan and Appendix D. The Florida Ave. Bridge will require relocation, due to excavation of the canal side slopes. Will this bridge be adjusted in place, or totally replaced (unclear)? The Relocation Cost is shown to be \$1.7 M, (implies total replacement) Clarify.

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The Florida Ave Bridge will be replaced with a 45 foot clear span, two-lane bridge. This is indicated in Appendix C - Engineering Investigations, pgs 25, 81, and 86.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 24-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 27-Feb-12

Current Comment Status: **Comment Closed**

4442744 Civil n/a' n/a n/a

(Document Reference: Volume 1)

Ref: Vol 1 Main Report and E.A. Pg 52, under "Canals". Daney Street to Interstate 10: This feature of work was recently constructed by St. Tammany Parish. Improvements to the existing canal included reshaping the existing canal to a trapezoidal section having a 40-ft bottom width with 3H:1V side slopes from the downstream side of the Daney Street Bridge to the upstream side of the I-10 Bridge (approx. 6,400 ft.) Will the 40 ft. bottom width, combined with the relatively flat proposed side slopes have any negative effect on commercial or residential properties (houses or other structures) along the top of the banks? Was this effect accounted for in property or relocations costs?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

There are no residential or commercial properties along this portion of the project.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 24-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 27-Feb-12

Current Comment Status: **Comment Closed**

4442749 Civil n/a' n/a n/a

(Document Reference: Volume 1)

Ref: Vol 1 Main Report and E.A. Pg 53. Several Utilities require Relocation, including Electric Power, Gas, Water, Sewer, Telephone, Cable. The local Sponsor is tasked with these Relocations. Has the District completed a Draft Relocations Appendix, outlining the list of Facility Owners, known facilities, Plan View Site Plans indicating location of each Line with respect to commercial or residential properties or other Project Features? Has the District Office of Counsel prepared Legal Opinions regarding Compensible Interest of these Facilities? What impact on Project Schedule might incur if all Relocations are being done, by Others (separate Contracts, managed by the Sponsors)?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The report does not have a "Relocations Appendix", but a section of Appendix C - Engineering Investigations addresses relocations. This section outlines a list of facility owners, the description of the utilities, and the cost of the utilities, Annex 8 of the Engineering Appendix is dedicated to the relocation maps that indicate where the utility relocations are located. A preliminary CIR is currently being prepared in coordination with Office of Counsel.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 29-Feb-12

1-1 Backcheck Recommendation Close Comment

A discussion was held between MVN and LRH regarding the requirements of a 533d Report. Is a Relocations Appendix required, as would be the case in a Feasibility Report. Conclusion was that 533d does NOT require a full Appendix addressing items to be Relocated. However, the Office of Counsel had done work on a CIR (Compensible Interest Report). It was decided NOT to make the Draft CIR a part of the larger 533d Report (open Government up to liability regarding payment for relocating utilities, roadways, etc.). Waiver is being requested thru MVD office.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4442753 Civil n/a' n/a n/a

(Document Reference: [Volume 1](#))

Ref: Vol 1 Main Report and E.A. Pg 53. West Diversion Detention Pond, along US Highway 11, near North Boulevard. The Plan calls for purchasing a significant parcel of land (approx. 14 acres) to build the pond, which will have a bottom El. of +7.0 ft. sloping down to +4.2 ft. Could a Cost Savings be achieved by reducing the Plan (surface) Area of the pond (from 14 acres to say 10 or even 7 acres) and extending the embankment berm and access road?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

This pond was constructed during the 1997-1998 time frame. No additional improvements will be required for this pond.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4442758 Civil n/a' n/a n/a

(Document Reference: [Volume 1](#))

Ref: Vol 1 Main Report and E.A. Pg 53. Robert Boulevard Detention Pond and Weir: The Plan calls for expanding the Plan (surface) Area from approx. 20 to 31 acres. Could a Cost Savings be achieved by maintaining the existing 20 acre Plan area, but further deepen the bottom (lower than El. +1.5 ft.) and extending the weir, near Robert Boulevard?

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

In accordance with ER-11-1-321, Value Engineering, a value engineering study needs to be conducted in the early design phase. The cost savings suggested in this comment will be addressed during the Value Engineering study.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4442795 Civil n/a' n/a n/a

(Document Reference: [Volume 2](#))

Ref: Vol. 2 Appendix C, Annex 1-8 (Pdg doc. page 42 of 65). Cross-Sections appear to be Computer cut/generated. Did INROADS software compute the excavation and embankment quantities? Were these (and all computer-generated) quantities "red-dot" checked? (manually checked for QC purposes?).

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

This feature of work was constructed during 2008-2010 time frame. The cross-sections you are referencing are part of the "As-Built" drawings that were submitted by the contractor to the City of Slidell. MVN spot checked these cross sections and they appear to be accurate.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 02-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4442806 Civil n/a' n/a n/a

(Document Reference: [Volume 2](#))

Ref. Vol 2, Pg 85, "Disposal of Excavated Materials". The Assumption was made that the excavated materials would be hauled "Off-Site" and disposed at an approved/licensed landfill. Does the Cost Est have provisions (Line Item) to pay for Laboratory Testing of these materials? (HTRW). Any potential contaminants within this material could substantially increase the cost of disposal and greatly limit the landfills that would have proper licensing to accept the material.

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation For Information Only

We consulted our non-Federal sponsor regarding the construction of the 40' channel (Daney St to I-10) located just south of the proposed excavation of the 10' channel (Fremaux to Daney). They indicated that through the course of construction (widening) of the W-14 from Daney St to I-10 they did not recall any contaminants being discovered or identified. The developers did a Phase I ESA which did not discover any recognized environmental conditions and did not require any further action on the site. In addition to the Phase I ESA, the state through the CDBG program and its consultant Environ performed an Environmental Review Record (ERR) which was paid for by the state and it also did not reveal any recognized environmental conditions for the site. The Corps also performed a Phase I ESA, and it was determined that the probability of HTRW material was low. The cost estimate does not contain a line item to pay for laboratory testing.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 09-Mar-12

1-2 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4442837 Civil n/a' n/a n/a

([Document Reference: Volume 2](#))

Ref: Vol 2, Appendix C, Relocations Maps (Plan Views). Plates 1 thru 4 (or Pdf Sheet Nos 62 thru 65 of 65). Features of the work are generally identified in the Legend and on Plan, however, it is unclear the Limits of the Contractor Work Limits for the Canal. Show the proposed CWL on the Maps. Include laydown areas, field office location, temporary haul roads and designated sites for disposal areas. Add the CWL to the Legend.

Submitted By: [Terry Shilley](#) (304-399-5934). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The preliminary CWL are indicated by the 25' temporary construction easements indicated on the project and relocation maps. The laydown areas/field office locations are indicated as staging areas on the maps. All excavated material from the project will be disposed at an approved solid waste landfill (This is indicated in the EA).

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 25-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Terry Shilley](#) (304-399-5934) Submitted On: 27-Feb-12

Current Comment Status: **Comment Closed**

4442966	Planning - Plan Formulation	n/a'	42	3
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If the objective is to reduce or eliminate flooding for the 10-year equivalent storm event, why did the non-structural look at flood proofing to the 100-year? Why not look at the 10-year equivalent to compare it to the structural alternative?

Submitted By: [Diane Karnish](#) (509-527-7239). Submitted On: 22-Feb-12

1-0 Evaluation For Information Only

There are two reasons why we did not evaluate raising the structures to the 10-year stage. First, after evaluating the first floor elevations of the existing structures by applying histograms it was found the majority of structures were already above the 10-year stage. The histograms showed that 93% of the structures were at or above the stage associated with the 25 year event. Secondly, we considered what would be the most implementable non-structural plan that would provide not only risk reduction from rainfall, but also surge and would meet the FEMA insurance criteria. A non-structural plan to the 10 year stage was not considered as acceptable versus a plan that would reduce risks up to the 100 year stage.

Submitted By: [Crystal Braun](#) (504-862-1959) Submitted On: 02-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Diane Karnish](#) (509-527-7239) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4443352	Real Estate	Appendix D, REP	n/a	n/a
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para. 2, LER Requirements, 3rd para. The stated 33.23 acres of perpetual channel and channel improvement easement does not appear to be consistent with the acreages provided on the plates in Exhibit B of the REP. Please ensure consistency between the exhibits and the text of the REP.

Submitted By: [Lynn Hoerner](#) (314-331-8157). Submitted On: 22-Feb-12

Revised 22-Feb-12.

1-0 Evaluation For Information Only

Did you come up with a different acreage or did the plates on the maps display too little information? We came up with acreage from the length provided of 11,135' and a width of 130' from another map.

Submitted By: [Hope Jackson](#) (504-862-2891) Submitted On: 27-Feb-12

1-1 Backcheck Recommendation Close Comment

It appeared to me that the acreages on the plates did not match the acreages in the REP. it may be easiest to remove the acreages required for the channel from the plates so that there is not a discrepancy. i do not dispute the accuracy of the acreage in the REP.

Submitted By: [Lynn Hoerner](#) (314-331-8157) Submitted On: 01-Mar-12

Current Comment Status: **Comment Closed**

4443356 Real Estate Appendix D, REP n/a n/a

The RE chart of accounts found in Exhibit C, and discussed in para. 10 of the REP does not appear to be consistent with Table 10 provided on page 56 of the main report. please ensure consistency between the REP and the main report.

Submitted By: [Lynn Hoerner](#) (314-331-8157). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

I agree that Lands & Damages should display 7.4M.

Submitted By: [Hope Jackson](#) (504-862-2891) Submitted On: 27-Feb-12

1-1 Backcheck Recommendation Close Comment

closed without comment

Submitted By: [Lynn Hoerner](#) (314-331-8157) Submitted On: 01-Mar-12

Current Comment Status: **Comment Closed**

4443358 Cost Engineering n/a' n/a n/a

([Document Reference: Summary](#))

Information provided for this ATR includes the report with appendices and annexes, including a cost appendix, an MII file and summary report, a partial listing of quantities, a total project cost summary (TPCS), an abbreviated risk analysis for contingency development, and real estate documentation. Information that is still required includes a construction schedule, documentation of district quality control, and additional project quantities.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

Revised 22-Feb-12.

1-0 Evaluation Concurred

All missing information has been turned in for review.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 09-Mar-12

1-1 Backcheck Recommendation Close Comment

All information has been provided or has been addressed with the reviewer. Issues pertaining to specific information provided is covered under other DRCHECKS comments. This issue is considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443361	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Main Report](#))

How were the flood reduction features in the reformulated W-14 Canal Improvements project selected from the original design features?

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Per SELA legislation, Recon Plan is the authorized for construction plan. Design features in Recon and 533d report are the same except for moving the earthen channel more to the south end of the project. Recon has earthen channel from Independe Dr to Fremaux Avenue. 533d Report has earthen channel from Fremaux Ave to I-10. This is indicated on the maps were provided at ATR Briefing.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 24-Feb-12

1-1 Backcheck Recommendation Close Comment

The response provided above is considered to be acceptable. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443367	Real Estate	Real Estate Considerations	53	n/a
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(Document Reference: [main report](#))

The 2nd para on page 53 states, "Minerals are not needed for project purposes and, therefore, would not be affected." This statement is not necessarily accurate if the NFS acquires Fee Excluding Minerals (with restriction on the use of the surface). It may be more accurate to remove the words, "and, therefore, would not be affected."

Submitted By: [Lynn Hoerner](#) (314-331-8157). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

We concur with removing the phrase "and, therefore, would not be affected."

Submitted By: [Hope Jackson](#) (504-862-2891) Submitted On: 27-Feb-12

1-1 Backcheck Recommendation Close Comment

closed without comment.

Submitted By: [Lynn Hoerner](#) (314-331-8157) Submitted On: 01-Mar-12

Current Comment Status: **Comment Closed**

4443370	Cost Engineering	Relocations paragraph	52	n/a
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(Document Reference: [Main Report](#))

The relocations paragraph on page 52 of the main report states that the relocation costs are in 2011 dollars but the prices include escalation costs. The midpoints of construction of these features are shown in FY2015. This discrepancy needs to be resolved.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

There is no longer a discrepancy. MVN Ofc of Counsel deleted this paragraph during their preliminary review of the main report.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 25-Feb-12

1-1 Backcheck Recommendation Open Comment

This comment will be closed after it has been verified in the revised main report that the changes have been made.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

1-2 Backcheck Recommendation Close Comment

The revised section has been reviewed and indicates costs reflect fully funded dollars. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 13-Mar-12

Current Comment Status: **Comment Closed**

4443382	Cost Engineering	Table 10 Federal and Non-federal Cost Breakdown	56	n/a
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(Document Reference: [Main Report](#))

The top of the table states it reflects 2011 price levels but the total costs reflect fully funded prices. This discrepancy needs to be resolved.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Table 10 is currently being revised based on feedback from MVN Ofc of Counsel and MVD reviews.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 22-Feb-12

1-1 Backcheck Recommendation Open Comment

This comment will be closed after it has been verified that the changes to the main report have been made.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

1-2 Backcheck Recommendation Close Comment

The title block in table 10 now identifies these costs as fully funded. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 13-Mar-12

Current Comment Status: **Comment Closed**

4443385	Cost Engineering	Table 10 Federal and Non-federal Cost Breakdown	56	n/a
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([Document Reference: Main Report](#))

Is it necessary to include a separate line item for the local sponsor's 5% cash contribution? This results in the total cost for the federal and non-federal portions that is higher than the total of the fully funded project. Since the local sponsor has constructed two of the features, couldn't the costs, or at least a portion of these costs, reflect the local sponsor's equivalent 5% contribution? Also, the TPCS does not show the same cost distribution for the federal and non-federal contributions since it is based on a 75% federal and 25% non-federal cost split. These differences should be resolved so that the tables agree.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

Revised 22-Feb-12.

1-0 Evaluation Concurred

Table 10 is currently being revised based on feedback from MVN Ofc of Counsel and MVD reviews.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 22-Feb-12

1-1 Backcheck Recommendation Open Comment

Closure of this comment will require review of the revised table and verification that the concerns have been addressed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

1-2 Backcheck Recommendation Close Comment

The table has been modified to address the concerns in this comment. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 13-Mar-12

Current Comment Status: **Comment Closed**

		TABLE 11		
		SOUTHEAST		
		LOUISIANA		
4443408	Cost Engineering	URBAN FLOOD CONTROL IMPROVEMENTS	n/a	n/a

(Document Reference: [Main Report](#))

The LEERDS and Scheduled Construction do not add up to the total project cost. Construction costs should be corrected.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Table 11 is currently being revised based on feedback from MVN Ofc of Counsel and MVD reviews.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 22-Feb-12

1-1 Backcheck Recommendation Open Comment

Closure of this comment will require review of the revised table and verification that the concerns have been addressed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

1-2 Backcheck Recommendation Close Comment

The table has been corrected. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 13-Mar-12

Current Comment Status: **Comment Closed**

4443413	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Quality Control Documentation](#))

Has a district quality control review been done by another cost estimator in the district and has the review been documented? If not, it should be completed and the documentation provided.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Yes, a review was performed. It is discussed in the cost appendix.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The DQC is documented in the cost appendix. The extent of the review has also been discussed with the Cost DX and is considered to be acceptable. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443418 Cost Engineering n/a' n/a n/a

(Document Reference: [Quality Control Documentation](#))

Have quantities been reviewed and has the review been documented? If not, the review should be completed and the documentation provided for review. Only a partial listing of quantities was provide for this review. Several of these quantities provided were checked by the reviewer and found to be accurate.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Quantities have been submitted for review.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 09-Mar-12

1-1 Backcheck Recommendation Close Comment

Quantities have been provided, reviewed, and are considered to be acceptable. This comment is therefore considered closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443437 Cost Engineering n/a' n/a n/a

(Document Reference: [MII Cost Estimating File](#))

Escalation Factors: The 40' trapezoidal channel improvement has been constructed by the local sponsor. The escalation factor for this feature in the MII file and in the TPCS, which reflects the midpoint of construction, is 3/15/2015. However, it is shown in the W-14 Canal Expenditure Fully Funded Schedule in the cost appendix as being done in FY 2014. These differences need to be resolved.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The escalation has been adjusted to FY 2014.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised MII file has been reviewed and the escalation factor for the 40' channel now reflects the second quarter of FY 2014, which matches the TPCS in the updated cost appendix. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443441 Cost Engineering n/a' n/a n/a

(Document Reference: [MII Cost Estimating File](#))

Escalation Factors: The west diversion detention pond and outlet structure has been constructed by the local sponsor. The escalation factor for this feature in the MII file and in the TPCS, which reflects the midpoint of construction, is 3/15/2015. However, it is shown in the W-14 Canal Expenditure Fully Funded Schedule in the cost appendix as being done in FY 2014. These differences need to be resolved.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The escalation has been adjusted to FY 2014.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Open Comment

The escalation factor in the revised MII estimate is based on a date of 10/15/2014 (2015Q1) whereas the TPCS lists an escalation date of 2014Q2. This needs to be resolved. Also, since the project is closed for new comments, the corrections are also required for these features: 10' channel (MII = 7/15/2014, TPCS = 2014Q3), Robert Blvd pond and weir (MII = 3/15/2015, TPCS = 2015Q3).

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

1-2 Backcheck Recommendation Close Comment

This issue was discussed with the estimator and it was determined that these changes would result in minimal changes to the estimate (

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443443 Cost Engineering n/a' n/a n/a

(Document Reference: [MII Cost Estimating File](#))

Escalation Factors: PED is shown in MII with a midpoint as 4/1/2015 (2015Q3). In the TPCS it matches the midpoint of construction for the various features, ranging from 2015Q1 through 2015Q3. Recommend reevaluation of PED escalations. The midpoint for PED for each feature should be before the midpoint of construction.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The escalation on the PED has been adjusted.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Open Comment

PED and S and A escalations use an average date for each. It is recommended that the escalation dates be based on the individual features as defined in the TPCS, especially since the work is assumed to be broken up into several contracts. As the escalation factors are currently defined, construction management is shown on some items as occurring after the midpoint of construction.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

1-2 Backcheck Recommendation Close Comment

This issue was discussed with the estimator and it was determined that these changes would result in minimal changes to the estimate (

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443448	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [MII Cost Estimating File](#))

Have labor rates been updated? This should be verified and documented.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Yes. All labor rates used in the MII estimate reflect current New Orleans metro rates. A note has been added to the estimate to reflect that.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

The revised MII file now states that labor rates are based on levels consistent with the date of the estimate. This comment is considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443453	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [MII Cost Estimating File](#))

Fuel rates need to be updated. They are low compared to current/recent pricing.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

Fuel rates were current for the time that the estimate was prepared (Oct 2011). Although fuel has increased slightly since that time period, the rates used in the estimate are still in an appropriate range. Increasing the fuel to Feb 2012 pricing would produce a negligible change in the estimate.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

The response regarding the fuel rates being current at the time the estimate was developed is acceptable. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443458	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [MII Cost Estimating File](#))

01 Lands and Damages: There is no escalation included in these costs. Recommend it be added to index the cost from the dates the real estate estimates were developed to the estimated dates when the real estate is to be acquired.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

Per guidance provided by MVD in May 2009, we should not escalate Lands and Damages costs.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 25-Feb-12

1-1 Backcheck Recommendation Close Comment

The response has been reviewed and is considered to be reasonable. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443460	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [MII Cost Estimating File](#))

02 Relocations - Utilities: Recommend reducing production for the CSI tasks where the default production is used but the actual quantities are small. For example, for T5 the removal of 55 lf of fiber optic cable has a cost of \$10.14 and requires 11 minutes to complete.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The production rate for the utilities has been adjusted downward due to the small quantity.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Production rates in the revised MII estimate have been adjusted to reflect small quantities for some items. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443462	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [MII Cost Estimating File](#))

02 Relocations - Bridges: Recommend reevaluating the conversion factor used to convert in place concrete quantity to hauling quantity after demolition. The estimate shows an increase of 25% but a reference used by the reviewer shows this to be in the range of 65%.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

After consulting with senior New Orleans estimators, the percentage was increased to 30% based on their recommendation. MVN has never used a percentage as high as 65%.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-0 Evaluation Concurred

The clearing and de-snagging item has been re-evaluated. Hauling and Disposal fees are now included.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised MII estimate has been reviewed. Loading and hauling costs are included in the clearing and snagging crew and an estimate of disposal fees is included in a separate item. The revisions are acceptable and this comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443471 Cost Engineering n/a' n/a n/a

(Document Reference: [MII Cost Estimating File](#))

Trapezoidal Channel Improvement – 10 ft and 40 ft: Need to be consistent in factor applied to convert in place quantities to hauling quantities for similar materials. The folder for the excavation of the channel with the 10 foot base has a 20% increase for hauling whereas the folder for the channel with the 40 foot base show 25%. This is observed on other places in the estimate as well.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

All of the excavation and hauling items have been reviewed and any inconsistencies have been removed.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The factors used to convert in place to hauling volumes in the revised estimate for the 10' and 40' trapezoidal channels were reviewed and determined to be 20% for both. Factors for the control and diversion structures were also determined to be 20%. Since the factors applied are consistent, this comment is considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443474 Cost Engineering n/a' n/a n/a

(Document Reference: [MII Cost Estimating File](#))

Trapezoidal Channel Improvement – 40 ft: The quantity list for the culverts states that each culvert will have a flap gate at one end but they are not included in the estimate.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Flap gates have been added to the estimate.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On:
01-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised MII estimate has been reviewed and the addition of the flapgates has been verified. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443478	Cost Engineering	n/a'	n/a	n/a
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([Document Reference: MII Cost Estimating File](#))

30 Planning, Engineering, and Design: The cost appendix identifies the source of the PED markup but it is recommended that additional documentation be added to explain the basis for it.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

More information has been added to the cost appendix to explain the PED percentage.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On:
23-Feb-12

1-1 Backcheck Recommendation Close Comment

Additional documentation has been added to the revised cost appendix. This comment is therefore considered closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443481	Cost Engineering	n/a'	n/a	n/a
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([Document Reference: MII Cost Estimating File](#))

31 Construction Management: The cost appendix identifies the source of the construction management markup but it is recommended that additional documentation be added to explain the basis for it.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

More information has been added to the cost appendix to validate the S&A percentage.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

The revised cost appendix provides further documentation to justify the construction management costs used. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443488	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Risk Based Contingency File](#))

An abbreviated risk analysis spreadsheet has been provided that lists four members of the PDT who provided input. The finished risk analysis needs to be included in the cost appendix and should agree with the other information in the report, including the TPCS and MII estimate.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Risk Analysis has been added to the cost appendix.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The risk analysis attachment in the cost appendix lists the team members for the original risk analysis where crystal ball was used and for the abbreviated risk analysis used for this report. Also, the contingencies in the TPCS and MII file match those shown in the risk analysis. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443501	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Risk Based Contingency File](#))

Inputs and Calculations Worksheet: Recommend including the two features that have already been constructed (trapezoidal channel with 40 foot base width and west diversion pond and control structure) in the risk analysis table on the Inputs and Calculations Worksheet since they are included in the other cost tables.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The items were listed in the risk analysis under "remaining construction items". They have been moved up and shown as individual items based on this comment.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

These two features that have already been constructed are now shown separately. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443511	Cost Engineering	n/a'	n/a	n/a
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([Document Reference: Risk Based Contingency File](#))

Inputs and Calculations Worksheet: The contingencies for the relocations (utilities and bridge) need to be adjusted so that the abbreviated risk analysis table in the Inputs and Calculations Worksheet and the MII estimate agree.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

All of the contingencies have been reviewed and are in agreement.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised contingencies for the relocations in the Inputs and Calculations worksheet in the Risk Based Contingency spreadsheet and the revised MII file have been compared and are in agreement. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443513	Cost Engineering	n/a'	n/a	n/a
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([Document Reference: Risk Based Contingency File](#))

A total contingency of 10.4% for utility relocations seems low, especially considering that the Corps would have minimal control over this work. The MII estimate lists this as 22.5%. Recommend reexamination of this item.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The utilities were re-evaluated in the risk analysis and the contingency was revised.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised contingencies for the utility relocations in the Inputs and Calculations worksheet and the MII file have been compared and are now in agreement with a reasonable contingency rate. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443518	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Risk Based Contingency File](#))

Risk Register Worksheet: The risk register worksheet for volatile commodities shows ratings of very unlikely with the impact being negligible for all features. Has any consideration been given to potential for steel and concrete pricing to rise significantly by the time the bridge is rebuilt?

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The risk analysis now addresses volatile commodities for the Florida Avenue bridge replacement.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The risk analysis now reflects uncertainties in future pricing for steel and concrete. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443528	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Construction Schedule](#))

A detailed construction schedule has not been provided. This needs to be provided and reviewed for the next submittal.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

A construction schedule has been provided.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Open Comment

The construction schedules have been reviewed. Since the project is closed to new comments, all comments related to the construction schedule are included in this comment: The construction schedules take into account the number of anticipated working days, weather days, and days off. Additional days for mob/demob/submittals are also included in the schedules. Although some of this appears to be excessive, especially given the reduced hours discussed in other comments related to the schedule, additional time should be included in construction schedules to cover unanticipated issues that could come up during construction. The anticipated schedules for each contract should be laid out in a calendar format such as for Microsoft project. The schedule should show the sequence of construction and interrelationships of construction items. The schedule should show items that are required to be constructed prior to other features as well as work that could be done concurrently. It should include additional time for unanticipated issues that may arise during construction. It is further recommended that PED and time for contract award be accounted for in the schedule unless sufficiently defined in a project schedule elsewhere. Issues related to specific schedules: Clear and snag channel: 60 days may be high for mob/demob/submittals for clearing the channel, especially since the work only requires 85 days. Florida Ave. Bridge: Is 16 days reasonable for construction of the concrete abutments and superstructure? This seems low, especially if concrete has to cure for 7 days. Robert Blvd Detention Pond and Weirs: Has consideration been given to doing any of the work concurrently, such as pond excavation and weir construction? Check clearing time. I calculated about 18 days without any float. It appears that the calculated number of days for items associated with the weirs, such as excavation, sheet pile installation, and riprap placement is actually the estimated number of hours. This should be corrected. 10' wide trapezoidal channel: Check excavation time. I calculate 73 hours rather than 73 days. Based on the reduced total estimated amount of work, mob/demob can also be reduced. The final schedule for each phase of construction, as well as PED and S & A, should be in agreement with escalation factors and dates used in the MII file, the TPCS, the main report, appendices, and backup information..

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 08-Mar-12

1-2 Backcheck Recommendation **Open Comment**

The construction schedule has been revised to show a calendar format with main items shown on the critical path and smaller items working concurrently. PED; advertise and award; and construction management have been added to the schedule. Concur that there are a few errors in the calculations for the durations; however corrections result in only 0.5% decrease in total project cost. Time is of the essence, and the team has a deadline to have the report signed by the end of March. Recommend that the estimate and schedule remain as is to avoid redoing the economic analysis and all of the tables in the report. Cost estimates and schedules will be examined in much greater detail as the project progresses in design.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 10-Mar-12

1-3 Backcheck Recommendation **Close Comment**

A revised construction schedule has been provided by the cost estimator. It is now in an acceptable calendar type format and shows the major features of construction and their interrelationships. It also includes time in the schedule for advertisement and award. As noted in the original comment, several recommendations were made by the reviewer regarding schedule time for individual. Based on discussions with the cost estimator and the response in this DRCHECKS comment, these changes would result in minor impacts to the overall project (

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 12-Mar-12

Current Comment Status: **Comment Closed**

4443531	Cost Engineering	n/a'	n/a	n/a
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([Document Reference: Total Project Cost Summary \(TPCS\)](#))

Recommend stating for the first cost summary section that this is the base cost representing the effective price level for the date the estimate was developed.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation **Concurred**

A note has been added to the TPCS

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation **Close Comment**

The revised TPCS now clearly shows that the first section represents the price levels at the time the estimate was developed. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

1-2 Backcheck Recommendation Open Comment

The TPCS has been reviewed again, and all discrepancies have been corrected.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 10-Mar-12

1-3 Backcheck Recommendation Close Comment

The cost estimator has reviewed the revised TPCS and found it to be accurate. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 12-Mar-12

Current Comment Status: **Comment Closed**

4443579	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Total Project Cost Summary \(TPCS\)](#))

Midpoint dates for the fully funded estimate show the midpoint of construction to coincide with the midpoint of PED. It is recommended that this be reexamined. The PED midpoint should occur before the midpoint of construction.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The midpoint of the PED has been adjusted.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Open Comment

As stated in a previous comment, it is recommended that the estimated dates of PED be based on the estimated dates of individual features of the project, especially since it is anticipated that the remaining work will be done under four separate contracts. The PED escalation date should show sufficient time between PED and midpoint of construction to allow for completion of plans and specs and contract award. For example, the clearing and snagging and the 10' trapezoidal channel contracts show the midpoint of construction at 2014Q3 with the PED 2014Q2. This does not appear to allow sufficient time to develop plans and specs and award.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

1-2 Backcheck Recommendation Close Comment

The issue was discussed with the estimator and it was determined that changes at this stage of the project would have major impacts to the project schedule without having much of an impact on the costs. It was therefore decided that the recommended changes would not be warranted at this time. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 09-Mar-12

Current Comment Status: **Comment Closed**

4443584 Cost Engineering n/a' n/a n/a

(Document Reference: [Total Project Cost Summary \(TPCS\)](#))

Recommend reexamination of real estate pricing. Escalation factors should be applied to reflect pricing at funding date as well as fully funded date if acquisition is different from the funding date.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

Based on discussions with Walla Walla and New Orleans Real Estate Division, escalation will not be included on real estate costs.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

Based on the response and an email the reviewer received from the Cost DX regarding this matter, escalation costs will not be required for real estate. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443592 Cost Engineering n/a' n/a n/a

(Document Reference: [Cost Appendix](#))

Executive Summary: The total project cost amount of \$23,200,461 is stated to be indexed to the end of the current fiscal year of 1, October 2011 but this actually corresponds to the fully funded total project cost amount, which is indexed to the midpoint of construction. This should be corrected.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The cost appendix has been revised.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised executive summary has been reviewed and the costs now state they reflect the fully funded cost. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443617 Cost Engineering n/a' n/a n/a

(Document Reference: Cost Appendix)

W-14 Canal Expenditure Schedule Fully Funded Table: The channel improvement for the 40 foot channel, which is close to 90% of the trapezoidal channel costs for the 10 foot and 40 foot channels, is shown in the table as FY 2014 whereas in the TPCS it is shown with a midpoint as FY2015Q2. This needs to be resolved so that the TPCS and table agree. This also applies to the West Diversion Pond and Weir.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The table has been revised.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised appendix shows the construction of the 40' channel in FY 2014 in the table. The midpoint of construction in the TPCS is 2014Q2. These dates are in agreement and the comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443624	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Cost Appendix)

W-14 Canal Expenditure Schedule Fully Funded Table: Real estate needs to reflect escalation costs based on when the acquisition costs will occur (FYs 2013 and 2014).

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

Per guidance provided by MVD, escalation should not be applied to real estate costs.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 25-Feb-12

1-1 Backcheck Recommendation Close Comment

Based on email correspondence between the reviewer and Cost DX, escalation costs are not required. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443630	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Cost Appendix)

6.2. DETENTION PONDS AND 7.10. 15 DETENTION PONDS: Paragraph 6.10. states that the Robert Boulevard Detention Pond will be expanded an additional 10.7 acres whereas paragraph 7.10. states the pond will be expanded 11.57 acres. Resolve the discrepancy.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The discrepancy has been revised.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

Both paragraphs now indicate that an additional 11.57 acres will be excavated. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443634	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Cost Appendix)

7.2. CONTINGENCIES: The development of the contingencies needs to be documented.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

This paragraph has been expanded to discuss how the contingencies were developed.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

Additional documentation in the revised appendix has been reviewed and is considered to be acceptable. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443638	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Cost Appendix)

7.3 ACQUISITION STRATEGY AND GENERAL SCHEDULE: This paragraph shows all the contracts for the remaining work are likely to be low bid. The risk analysis states that some contracts are likely to go through some sort of small business acquisition plan. Does this conflict with the assumption of low bid awards?

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Non-concurred

No, it does not. New Orleans District routinely advertises small business set asides. We have also put out many 8(a) and HubZone MATOCs in the last few years with task orders being awarded to the lowest bidder.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The response is acceptable. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4443646	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Cost Appendix](#))

7.11. 30 PLANNING, ENGINEERING, AND DESIGN: PED is actually 10% in the MII file, not 12% as shown in the cost appendix. Resolve this discrepancy.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The discrepancy has been corrected.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

The paragraph has been corrected in the revised appendix. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443648	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Cost Appendix](#))

7.12. 31 SUPERVISION AND ADMINISTRATION: S and A is actually 12% in the MII file, not 10% as shown in the cost appendix. Resolve this discrepancy.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The discrepancy has been corrected.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

The paragraph in the revised appendix has been corrected. The comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443650	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Cost Appendix](#))

8.0 ATTACHMENTS: The cost appendix needs to include attachments for the TPCS, a detailed construction schedule, and the risk based contingency analysis.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The attachments have been added.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The listed attachments have been added to the revised cost appendix. Any issues related to these attachments are contained in specific DRCHECKS comments.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4443662	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: [Cost Appendix](#))

8.0 ATTACHMENTS: The MII summary attachment at the end of the appendix should be modified to remove quantities so that the report would not be exposing proprietary information related to unit pricing in the government's estimate.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The quantities have been removed from the report.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 23-Feb-12

1-1 Backcheck Recommendation Close Comment

Quantities have been removed from the MII summary file. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4444277 Cost Engineering n/a' n/a n/a

(Document Reference: [Risk Analysis Spreadsheet](#))

Input and Calculations worksheet: Breakout remaining construction items. The total price for these items is too large to be lumped together.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation Concurred

The items have been broken out.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised Input and Calculations worksheet has been reviewed and now shows the remaining construction items broken out into the two individual features that have been constructed. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4444285 Cost Engineering n/a' n/a n/a

(Document Reference: [Risk Analysis Spreadsheet](#))

PDT Involvement: Involving only 4 people for a project this size is insufficient. Recommend involving the entire team including any Rock Island team members that were involved in the developing the estimate.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 22-Feb-12

1-0 Evaluation For Information Only

For the original project in 2009, Walla Walla performed a crystal ball risk analysis and prepared a risk register based on input from the entire PDT. For the reformulated plan, a smaller team met in 2010 and reviewed the risk register again. A note explaining this has been added to the risk analysis file.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-0 Evaluation Concurred

It has been verified that this conduit replacement is needed. The cost has been added to the estimate.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The quantities in the revised MII estimate have been changed to "1 each" for both T5 and T6. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4444786	Hydrology	Appendix C	Page 12, 3rd paragraph	n/a
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Appendix C, Page 12, 3rd paragraph. Change "probability" to "probabilities" in the first sentence. Change "time interval" to "time steps", or "time step intervals". (Reference DrChecks Comment 3021270 in 2010 review)

Submitted By: [Kenneth Halstead](#) (304-399-5811). Submitted On: 23-Feb-12

1-0 Evaluation Concurred

Revisions have been made to subject paragraph.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 29-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Kenneth Halstead](#) (304-399-5811) Submitted On: 01-Mar-12

Current Comment Status: **Comment Closed**

4444790	Hydrology	Appendix C	Page 20, Page 30	n/a
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Appendix C, Page 20, Boundary and Initial Storage Conditions and Page 30, 2nd paragraph of Alternative Plan SA42 with Pumping Station Alternative refer to Mean Annual Hightide for Lake Pontchartrain as a boundary condition for the hydraulic modeling. DrChecks Comment 3021406 in 2010 review indicates that a Lake Pontchartrain storm surge joint probability analysis was in progress. What were the results of that analysis as compared to the Mean Annual Hightide that was used in this study?

Submitted By: [Kenneth Halstead](#) (304-399-5811). Submitted On: 23-Feb-12

1-0 Evaluation Concurred

The joint probability analysis of maximum annual 24-hour precipitation (Sta ID 168539) and Stage at Rigolets Tide Gage indicated that these two parameters are independent at the 95% confidence level. The Gumbel Frequency distribution fits the Rigolets coincident stage data reasonably well yielding a 10-yr stage equal to

the High Annual Mean Tide used as downstream boundary condition.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 02-Mar-12

1-1 Backcheck Recommendation Close Comment

Consider documenting this in the report also.

Submitted By: [Kenneth Halstead](#) (304-399-5811) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4445771 Risk Assessment n/a' n/a n/a

1. REVIEW CONCERN: The report does not clearly summarize and emphasize the level of residual flood risk in the study area once the project is implemented. The residual risk information is shown in the economic numbers and tables, but neither the appendix nor the main report summarize and discuss the implication of these residual risk numbers. Instead, the report seems to unintentionally imply a significant risk reduction. For example, each section under socio-economic resources states that flood risk would persist in the no action alternative, but the descriptions of future with-project conditions do not state that the high level of flood risk would persist, albeit at a slightly reduced level. _____

BASIS FOR THE CONCERN: ER1105-2-100 points out that projects with a "lower level of performance" have a higher residual risk. Accordingly, the ER requires that residual risks be carefully analyzed, documented and communicated to the sponsor and flood plain occupants. _____

SIGNIFICANCE OF THE CONCERN: Moderate to High. The study meets the objectives of the 533 authorization, but the report shows that the project will reduce less than 10% of annual damages, and that many project reaches will have no damage reduction (most of the benefit occurs in reach B4). It is helpful that the report shows these numbers, but it is important to make sure that the implications of these numbers are explicitly summarized for the community and the sponsor. _____

ACTION NEEDED TO RESOLVE THE CONCERN: Include text in the main report that clearly communicates residual risks to the community. It is suggested that statements be included in each of the future with project paragraphs, and that a summary section be prepared to explicitly communicate where risks have been reduced and what level of risk remains in the study area.

Submitted By: [Brian Harper](#) (4097663886). Submitted On: 23-Feb-12

1-0 Evaluation Concurred

Concur - additional risk information will be added to report (DRAFT language sent to B. Harper for review in separate e-mail)

Submitted By: [Michael Voich](#) (504-862-1636) Submitted On: 12-Mar-12

1-1 Backcheck Recommendation Close Comment

I have reviewed the draft language and concur with adding to the report as written.

Submitted By: [Brian Harper](#) (4097663886) Submitted On: 12-Mar-12

Current Comment Status: **Comment Closed**

4445847 Biology-Ecology n/a' pdf page 65, report page 54 n/a

(Document Reference: Vol 1, Main Report)

The SEA #409A comment period was closed after this report was written with comments addressed and a Final FWCA report received from USFWS. Please update this report to reflect current NEPA status.

Submitted By: [Kevin Pigott](#) (901-544-4309). Submitted On: 23-Feb-12

1-0 Evaluation Concurred

Environmental compliance for the subject project is complete. The Fish and Wildlife Coordination Act Report for the subject project was submitted on 9 January 2012.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 29-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Kevin Pigott](#) (901-544-4309) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4447967	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Risk Analysis, TPCS, and Report Tables)

For the two features that have already been constructed (40' trapezoidal channel and the west diversion pond and control structure), it is recommended that these items be placed in the first year funding is approved where no additional escalation costs will be required.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 24-Feb-12

Revised 24-Feb-12.

1-0 Evaluation Concurred

The tables have been adjusted to reflect this.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 03-Mar-12

1-1 Backcheck Recommendation Close Comment

Both of these features are shown in FY 2014 in the TPCS and Table 13. This comment is therefore considered to be closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4447983	Cost Engineering	n/a'	n/a	n/a
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(Document Reference: Risk Analysis)

Recommend that the two features that have already been constructed (40' trapezoidal channel and the west diversion pond and control structure) be separated out in risk analysis like the other project features.

Submitted By: [Matt Bray](#) (651-290-5647). Submitted On: 24-Feb-12

1-0 Evaluation Concurred

These two features have been identified separately in the risk analysis.

Submitted By: [CHRISTINA KRAMER](#) (504-862-1218) Submitted On: 01-Mar-12

1-1 Backcheck Recommendation Close Comment

The revised risk analysis has been reviewed and the recommended changes have been verified. This comment is therefore closed.

Submitted By: [Matt Bray](#) (651-290-5647) Submitted On: 05-Mar-12

Current Comment Status: **Comment Closed**

4450747	Planning - Plan Formulation	n/a'	52, 54	n/a
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Were the costs for the detention ponds included in the NED costs?

Submitted By: [Diane Karnish](#) (509-527-7239). Submitted On: 27-Feb-12

Revised 27-Feb-12.

1-0 Evaluation Concurred

Costs for the detention ponds were included.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 27-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Diane Karnish](#) (509-527-7239) Submitted On: 28-Feb-12

Current Comment Status: **Comment Closed**

4450755	Economics	n/a'	n/a	n/a
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Were impacts up/downstream of the project identified or quantified? Did not see it discussed anywhere in the report.

Submitted By: [Diane Karnish](#) (509-527-7239). Submitted On: 27-Feb-12

1-0 Evaluation Concurred

Impacts on the study area, which includes the W-13 and W-15 watersheds adjacent to the W-14 canal basin, were identified in the 1996 Slidell Reconnaissance Report. The 533(d) Report quantified the impacts on the W-14 project area of the features identified in the 1996 Report.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 02-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Diane Karnish](#) (509-527-7239) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4450766 Economics n/a' econ app page 3 n/a

The econ used future landuse assumptions. Were the same assumptions used for the H&H as it relates to impervious surfaces within the study area? Econ appendix page 3

Submitted By: [Diane Karnish](#) (509-527-7239). Submitted On: 27-Feb-12

1-0 Evaluation Concurred

Future land use parameters affecting runoff, including percent impervious, were assumed identical with existing land use paramters in the H&H anaysis. This assumption was based on ordinances regarding development that are enforced by the local partners as a condition of participation in the project. Post-development peak discharges into the canal are limited by these ordinances to pre-development values for events with lesser frequency than the design storm.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 02-Mar-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Diane Karnish](#) (509-527-7239) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

2. Cost Agency Technical Review Certification Statement

**WALLA WALLA COST ENGINEERING TECHNICAL
CENTER OF EXPERTISE**

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For

**MVN – Southeast Louisiana Urban Flood Control
W-14 Canal Improvements**

The SELA W-14 Canal Improvements project, as presented by New Orleans District has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Technical Center of Expertise (Cost TCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of March 14, 2012, the Cost TCX certifies the estimated total project cost of:

FY 2013 Price Level: \$22,201,000
Fully Funded Amount: \$22,749,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.



**US Army Corps
of Engineers®**



**Kim C. Callan, PE, CCE, PM1
Chief, Cost Engineering
Walla Walla District**

Date 14 Mar 2012

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: SELA W-14 Canal
 LOCATION: St. Tammany Parish, LA
 DISTRICT: MVN New Orleans
 POC: CHIEF, COST ENGINEERING, Tom Murphy
 PREPARED: 3/10/2012

This Estimate reflects the scope and schedule in report; SELA W-14 Canal 533d Report Dec 2011

WBS NUMBER	Feature & Sub-Feature Description	ESTIMATED COST			PROJECT FIRST COST			TOTAL PROJECT COST (FULLY FUNDED)						
		COST (\$K)	CNTG (\$K)	CNTG (%)	ESC (%)	COST (\$K)	CNTG (\$K)	CNTG (%)	Spent Thru: 17-Oct-11 (\$K)	COST (\$K)	CNTG (\$K)	FULL (\$K)		
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
02	RELOCATIONS	\$1,658	\$463	28%	\$2,122	1.6%	\$1,684	\$471	\$2,155	1.6%	\$1,737	\$485	\$2,222	
09	CHANNELS & CANALS	\$2,911	\$567	19%	\$3,478	1.6%	\$2,957	\$576	\$3,533	1.6%	\$3,022	\$589	\$3,611	
15	FLOODWAY CONTROL & DIVERSION STF	\$5,223	\$1,113	21%	\$6,336	1.6%	\$5,305	\$1,130	\$6,435	1.6%	\$5,473	\$1,167	\$6,640	
CONSTRUCTION ESTIMATE TOTALS:		\$9,793	\$2,143		\$11,936	1.6%	\$9,946	\$2,177	\$12,123	1.6%	\$10,232	\$2,241	\$12,473	
01	LANDS AND DAMAGES	\$5,930	\$1,483	25%	\$7,413		\$5,930	\$1,483	\$7,413		\$5,930	\$1,483	\$7,413	
30	PLANNING, ENGINEERING & DESIGN	\$979	\$204	21%	\$1,183	2.4%	\$1,003	\$209	\$1,212	2.4%	\$1,054	\$220	\$1,274	
31	CONSTRUCTION MANAGEMENT	\$1,175	\$244	21%	\$1,419	2.4%	\$1,204	\$250	\$1,453	2.4%	\$1,317	\$273	\$1,590	
PROJECT COST TOTALS:		\$17,877	\$4,074	23%	\$21,951	1.1%	\$18,083	\$4,118	\$22,201	1.1%	\$18,533	\$4,216	\$22,749	
											ESTIMATED FEDERAL COST: \$11,977			
											ESTIMATED NON-FEDERAL COST: \$10,772			
											(LERRDS and 5% CASH CONTRIBUTION)			
											ESTIMATED TOTAL PROJECT COST: \$22,749			
											O&M OUTSIDE OF TOTAL PROJECT COST:			

***** TOTAL PROJECT COST SUMMARY *****

***** CONTRACT COST SUMMARY *****

PROJECT: SELA W-14 Canal
 LOCATION: St. Tammany Parish, LA
 This Estimate reflects the scope and schedule in report: SELA W-14 Canal 533d Report Dec 2011

DISTRICT: MVN New Orleans
 POC: CHIEF, COST ENGINEERING, Tom Murphy
 PREPARED: 3/10/2012

WBS NUMBER	Feature & Sub-Feature Description	Estimate Prepared: 17-Oct-11		Effective Price Level: 17-Oct-11		RISK BASED		Civil Works		Base Cost representing effective price level for the date estimate was developed		Fully Funded Project Estimate		
		C	D	E	F	G	H	I	J	P	L	M	N	O
		(\$K)	(\$K)	(%)	(\$K)	(%)	(\$K)	(\$K)	(\$K)	(%)	(\$K)	(%)	(\$K)	(\$K)
PHASE 1														
09	CHANNELS & CANALS	\$197	\$45	23%	\$242	1.6%	\$200	\$46	\$246	2.5%	\$205	\$47	\$252	
CONSTRUCTION ESTIMATE TOTALS:		\$197	\$45	23%	\$242		\$200	\$46	\$246		\$205	\$47	\$252	
01	LANDS AND DAMAGES	\$5,930	\$1,483	25%	\$7,413	2.4%	\$5,930	\$1,483	\$7,413	5.1%	\$5,930	\$1,483	\$7,413	
30 PLANNING, ENGINEERING & DESIGN														
1.0%	Project Management	\$2	\$0	21%	\$2	2.4%	\$2	\$0	\$2	5.1%	\$2	\$0	\$3	
0.5%	Planning & Environmental Compliance	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
6.0%	Engineering & Design	\$11	\$2	21%	\$13	2.4%	\$11	\$2	\$14	5.1%	\$12	\$2	\$14	
0.5%	Engineering Tech Review ITR & VE	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
0.5%	Contracting & Reprographics	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
0.5%	Engineering During Construction	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
0.5%	Planning During Construction	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
0.5%	Project Operations	\$1	\$0	21%	\$1	2.4%	\$1	\$0	\$1	5.1%	\$1	\$0	\$1	
31 CONSTRUCTION MANAGEMENT														
10.0%	Construction Management	\$20	\$4	21%	\$24	2.4%	\$20	\$4	\$25	9.4%	\$22	\$5	\$27	
1.0%	Project Operation:	\$2	\$0	21%	\$2	2.4%	\$2	\$0	\$2	9.4%	\$2	\$0	\$3	
1.0%	Project Management	\$2	\$0	21%	\$2	2.4%	\$2	\$0	\$2	9.4%	\$2	\$0	\$3	
CONTRACT COST TOTALS:		\$6,170	\$1,537		\$7,707		\$6,174	\$1,538	\$7,712		\$6,182	\$1,540	\$7,722	

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: SELA W-14 Canal
 LOCATION: St. Tammany Parish, LA
 This Estimate reflects the scope and schedule in report; SELA W-14 Canal 533d Report Dec 2011

DISTRICT: MVN New Orleans
 POC: CHIEF, COST ENGINEERING, Tom Murphy

PREPARED: 3/10/2012

WBS NUMBER	Civil Works Feature & Sub-Feature Description	Estimate Prepared: 17-Oct-11		Effective Price Level: 17-Oct-11		Program Year (Budget EC): 2013		Effective Price Level Date: 1 OCT 12		2013		2014Q4		FULLY FUNDED PROJECT ESTIMATE				
		COST (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CNTG (%)	TOTAL (\$K)	ESC (%)	Mid-Point Date	COST (\$K)	CNTG (%)	FULL (\$K)	ESC (%)	Mid-Point Date	COST (\$K)	CNTG (%)	FULL (\$K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
02	PHASE 2 RELOCATIONS	\$1,331	\$388	29%	\$1,719	1.6%	\$1,352	\$394	\$1,746	3.0%	\$1,392	\$406	\$1,798	2014Q4	2014Q2	\$14	\$3	\$17
CONSTRUCTION ESTIMATE TOTALS:		\$1,331	\$388	29%	\$1,719			\$394	\$1,746			\$406	\$1,798					
01	LANDS AND DAMAGES																	
30	PLANNING, ENGINEERING & DESIGN																	
1.0%	Project Management	\$13	\$3	21%	\$16	2.4%	\$13	\$3	\$16	5.1%	\$14	\$3	\$17	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Planning & Environmental Compliance	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$84	\$17	\$101
6.0%	Engineering & Design	\$78	\$16	21%	\$94	2.4%	\$80	\$17	\$97	5.1%	\$84	\$17	\$101	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Engineering Tech Review ITR & VE	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Contracting & Reprographics	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Engineering During Construction	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Planning During Construction	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$8	\$2	\$9
0.5%	Project Operations	\$7	\$1	21%	\$8	2.4%	\$7	\$1	\$9	5.1%	\$8	\$2	\$9	2014Q2	2014Q2	\$8	\$2	\$9
31	CONSTRUCTION MANAGEMENT																	
10.0%	Construction Management	\$133	\$27	21%	\$160	2.4%	\$136	\$27	\$164	9.4%	\$149	\$30	\$179	2015Q2	2015Q2	\$15	\$3	\$18
1.0%	Project Operation:	\$13	\$3	21%	\$16	2.4%	\$13	\$3	\$16	9.4%	\$15	\$3	\$18	2014Q2	2014Q2	\$15	\$3	\$18
1.0%	Project Management	\$13	\$3	21%	\$16	2.4%	\$13	\$3	\$16	9.4%	\$15	\$3	\$18	2014Q2	2014Q2	\$15	\$3	\$18
CONTRACT COST TOTALS:		\$1,623	\$448		\$2,071			\$456	\$2,107			\$472	\$2,185					

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: SELA W-14 Canal
 LOCATION: St. Tammany Parish, LA
 This Estimate reflects the scope and schedule in report: SELA W-14 Canal 533d Report Dec 2011

DISTRICT: MVN New Orleans
 POC: CHIEF, COST ENGINEERING, Tom Murphy
 PREPARED: 3/10/2012

WBS NUMBER	Feature & Sub-Feature Description	Estimate Prepared: 17-Oct-11		Effective Price Level: 17-Oct-11		Program Year (Budget EC): 2013		Effective Price Level Date: 1 OCT 12		FULLY FUNDED PROJECT ESTIMATE			
		COST (\$K)	C	COST (\$K)	C	ESC (%)	COST (\$K)	CNTG (\$K)	TOTAL (\$K)	J	ESC (%)	COST (\$K)	CNTG (\$K)
A	B					G	H	I	J	L	M	N	O
PHASE 3													
02	RELOCATIONS	\$327	\$75	23%	\$402	1.6%	\$332	\$76	\$409	3.8%	\$345	\$79	\$424
15	FLOODWAY CONTROL & DIVERSION STF	\$3,202	\$734	23%	\$3,936	1.6%	\$3,252	\$745	\$3,998	3.8%	\$3,377	\$774	\$4,151
15	FLOODWAY CONTROL & DIVERSION STF	\$2,021	\$379	19%	\$2,400	1.6%	\$2,053	\$385	\$2,438	2.1%	\$2,096	\$393	\$2,489
CONSTRUCTION ESTIMATE TOTALS:		\$5,551	\$1,188	21%	\$6,739		\$5,637	\$1,207	\$6,844		\$5,818	\$1,246	\$7,064
01	LANDS AND DAMAGES												
30 PLANNING, ENGINEERING & DESIGN													
1.0%	Project Management	\$56	\$12	21%	\$68	2.4%	\$57	\$12	\$69	5.1%	\$60	\$13	\$73
0.5%	Planning & Environmental Compliance	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
6.0%	Engineering & Design	\$331	\$69	21%	\$400	2.4%	\$339	\$71	\$410	5.1%	\$356	\$74	\$431
0.5%	Engineering Tech Review ITR & VE	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
0.5%	Contracting & Reprographics	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
0.5%	Engineering During Construction	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
0.5%	Planning During Construction	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
0.5%	Project Operations	\$28	\$6	21%	\$34	2.4%	\$29	\$6	\$35	5.1%	\$30	\$6	\$36
31 CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	\$555	\$116	21%	\$671	2.4%	\$569	\$118	\$687	9.4%	\$622	\$130	\$752
1.0%	Project Operation:	\$56	\$12	21%	\$68	2.4%	\$57	\$12	\$69	9.4%	\$63	\$13	\$76
1.0%	Project Management	\$56	\$12	21%	\$68	2.4%	\$57	\$12	\$69	9.4%	\$63	\$13	\$76
CONTRACT COST TOTALS:		\$6,773	\$1,442		\$8,215		\$6,889	\$1,467	\$8,357		\$7,163	\$1,526	\$8,689

3. MVN District Quality Review DrChecks Comments

Comment Report: All Comments

Project: SELA W-14 Canal Improvement Project

Review: DRAFT 533d Report - 17 Dec 2011

Displaying 56 comments for the criteria specified in this report.

Id	Discipline	Section/Figure	Page Number	Line Number
4347788	Hydraulics	n/a'	H&H-General-page 1	n/a
line 10: delete "corporate boundary"				

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 22-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4347801	Hydraulics	n/a'	H&H-Hydraulic Modeling-History-page12	n/a
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1st line: delete "(Reference 3)"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 22-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Open Comment

I take back this comment since references are listed in report,

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

1-2 Backcheck Recommendation Open Comment

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

1-3 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4347839 Hydraulics n/a' H&H-HEC-RAS
(Hydraulic) Model-page n/a
14

2nd paragraph,1st line: replace "14" with "21"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 22-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4347891 Hydraulics n/a' H&H-HEC-RAS
(Hydraulic) Model-page n/a
14

2nd paragraph-2nd line: replace "plus the 15 existing storage areas (10 in Fritchie Marsh) are shown in Figure 2" with "minus the 10 storage areas in Fritchie Marsh are shown in Figure 4"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 22-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4347902 Hydraulics n/a' H&H-HEC-RAS
(Hydraulic) Model-page n/a
14

4th paragraph,lines 3 and 4: delete "during storm events"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 22-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348289	Hydraulics	Figure 3	18	n/a
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Move "Dummy" culverts leaders to end at culverts

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/5/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348294	Hydraulics	n/a'	24	16
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Add comma after economic area

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348299	Hydraulics	n/a'	25	last
---------	------------	------	----	------

replace "lined" instead of "covered" in all instances

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348303 Hydraulics Figure 5 28 n/a

Move Figure 5 to follow paragraph: "Results of the Reformulated Plan Hydraulic Modeling" (change figure number to 6 and figure number 6 to 5)

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

Revised 23-Dec-11.

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348307 Hydraulics n/a' 29 9

Change Figure number to 5 in "(see Figure 6). Also change number of picture of Kings Point Pumping Station to 5

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348311 Hydraulics n/a' 31 2

Replace "damage" with "economic"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348312	Hydraulics	n/a'	31	3
---------	------------	------	----	---

Add "with and" after existing

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348314	Hydraulics	n/a'	31	7
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Add at end of paragraph: "The reduction in stages upstream of I-10 that would result from implementation of the Reformulated Plan is shown graphically in Figure 5"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12. Based on previous revisions, this figure should now be 6 not 5.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Thank you

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348315	Hydraulics	n/a'	34 thru 37	n/a
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"Flood Event (percent exceedance)" missing across top of exceedance numbers in Tables 9 thru 12

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12
Current Comment Status: **Comment Closed**

4348317	Hydraulics	Figure 5	28	n/a
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Flow lines and legend are missing in this figure. Contact me if necessary to resend figure. Change figure number to 6.

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

Revised 23-Dec-11.

1-0 Evaluation Concurred
Revisions completed 1/3/12. Flow lines and legend are visible in Figure 6.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12
Current Comment Status: **Comment Closed**

4348325	Hydraulics	n/a'	31	3
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Delete "project" after "their.."

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348331 Hydraulics n/a' 31 5

After values replace "the impact of increases in future land use" for "future land use impact"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348335 Hydraulics n/a' 33 13

Add at end of paragraph: "The Economic Reaches are shown in Figure 4 along with the storage areas representing them in the HEC-RAS model"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348343 Hydraulics Overview of
Risk-Based Analysis Economics-Section VI 21

Consider deleting: "and for each hydrologic/hydraulic variable used to calculate the stage-frequency curves"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Check and Resolve

I revised the sentence to the following "To account for uncertainty, the analysis considered a range of possible values for each economic and hydrologic/hydraulic input, which is then used to calculate the elevation-or stage-damage curves."

Submitted By: [Crystal Braun](#) (504-862-1959) Submitted On: 18-Jan-12

1-1 Backcheck Recommendation Close Comment

No further comments

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 02-Mar-12

Current Comment Status: **Comment Closed**

4348479	Hydraulics	Geotechnical Investigation-Project Design	76	n/a
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The Reformulated Plan proposes a side slope for the 10' bottom width canal between Fremaux and Daney Avenues of 3H:1V. In the 2009 533(d) Report SA 42 Plan the side slope proposed for this same stretch of canal was 3H:2V. If the borings test results supported the 3H:2V side slope in 2009 shouldn't the Reformulated Plan propose the same rather than the flatter slope?

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Recall discussing this at the early stage of reformulation. Determining whether to use 3H:1V or 3H:2V can be investigated during design phase.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Feb-12

1-1 Backcheck Recommendation Close Comment

No further comments

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Feb-12

Current Comment Status: **Comment Closed**

4348499	Hydraulics	Project Design	78	n/a
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Consider deleting "detail" in front of cost since further below it is stated that "designs presented in this report are not complete"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348502	Hydraulics	Project Design	79	7
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Replace "man-made" for "natural"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348531	Hydraulics	Project Design	81	12
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replace "construction" with "reconstruction"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348535	Hydraulics	Civil Design-Project Design Datums	82	12
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Replace "add 0.5 feet" with "subtract 0.8 feet"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12
Current Comment Status: **Comment Closed**

4348537	Hydraulics	Civil Design-Project Design Datums	82	19
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Consider deleting "and the load magnitude on the canal walls" since U-frame canal sections are not required in the Reformulated Plan

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12
Current Comment Status: **Comment Closed**

4348547	Hydraulics	Table 19	85	n/a
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Delete "100' overflow weir"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred
Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12
Current Comment Status: **Comment Closed**

4348659	Hydraulics	n/a'	25	4
---------	------------	------	----	---

Delete "construction of a" . Replace with "An already constructed". Also delete "excavating a" and replace with "an excavated"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions Completed 1/3/12. Instead of using "an already constructed", used the words "a previously constructed".

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Open Comment

Thank you.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

1-2 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348673

Hydraulics

Project
Design-General

78

n/a

Consider deleting "detailed" in front of cost since further below it is stated that "design presented in this report is incomplete"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

This is a duplicate of comment 4348499

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348679

Hydraulics

Project
Design-General

79

7

Replace "natural" with "man-made"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

This is a duplicate of comment 4348502.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348685	Hydraulics	Project Design-General-Table 18	n/a	n/a
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Delete 100' and revise "weir" to "weirs"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348697	Hydraulics	Project Design-West Diversion Pond	81	9
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Replace "+5.00 to +4.25 feet" with "+6 to +5.5 feet"

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/3/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4348715	Hydraulics	Project Design Alignment	82	13
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Delete "and the load magnitude on the canal walls" since u-frame canals are not used in the Reformulated Plan

Submitted By: [Joseph Diaz](#) (504-862-1457). Submitted On: 23-Dec-11

1-0 Evaluation Concurred

This is a duplicate of comment 4348537.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 03-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4354909	Civil	n/a'	n/a	n/a
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file: "..Vol2_Annex1to8.." pdf pg 49/52: M-1(#1) should be taken off relocation map since it is not a relocation item anymore. M-1 in the relocation text is only described as being at the Daney street bridge. Likewise, at pdf page 51/52, relocation map showing the Daney street bridge, "M-1(#2)" should be changed to just "M-1"

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

Revised 30-Dec-11.

1-0 Evaluation Concurred

Document will be revised

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

1-2 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Paul Oakland](#) (504-862-2949) Submitted On: 11-Jan-12

Current Comment Status: **Comment Closed**

4354913	Civil	n/a'	n/a	n/a
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file: "...Vol2_Annex1to8...pdf": pdf page 51/52, Relocation map, near Cousin street bridge. Relocation item P-21 was removed from the relocation map, and should be put back, near P-22 and T-9.

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

Revised 30-Dec-11.

1-0 Evaluation Concurred

Document will be revised.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4354927	Civil	n/a'	n/a	n/a
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(Document Reference: [Vol2_AppAtoE...pdf](#))

file: "...Vol2_AppAtoE...pdf": page 98 (pdf pg 230/269): under C. (relocation item P-23). Error in text: "Construction of the bridge at Cousin Street..."

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

This will be reworded as: "Construction activities in the vicinity of the Cousin Street Bridge..."

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4354931	Civil	n/a'	n/a	n/a
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(Document Reference: [Vol2_AppAtoE...pdf](#))

file: "...Vol2_AppAtoE...pdf" page i (pdf pg 125/269) "45-ft wide clear span bridge". Delete "wide", and change to "45-ft clear span bridge".

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/11/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 12-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Paul Oakland](#) (504-862-2949) Submitted On: 18-Jan-12

Current Comment Status: **Comment Closed**

4354937 Civil n/a' n/a n/a

(Document Reference: [Vol2_AppAtoE...pdf](#))

file: "...Vol2_AppAtoE...pdf" page 100 (pdf pg 232/269). For relocation item W6: "the free span between supports should be increased .. to at least 45 ft between the new supports." This was based on a 45-ft wide rectangular channel. Top-of-bank width, after construction of current recommended plan, is not apparent.

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

Concur with your comment. Info appears to be adequate for feasibility phase. Detail design including minor adjustments will be performed during PED

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Paul Oakland](#) (504-862-2949) Submitted On: 18-Jan-12

Current Comment Status: **Comment Closed**

4354940 Civil n/a' n/a n/a

(Document Reference: [Vol2_AppAtoE...pdf](#))

file: "..Vol2_AppAtoE...pdf" page 4 (pdf pg 9/269) Error in text. "would be placed at the round elevation". "round" should be "ground".

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/5/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4354946 Civil n/a' n/a n/a

(Document Reference: [Vol2_AppAtoE...pdf](#))

file: "..Vol2_AppAtoE...pdf" pg 79 (pdf pg 211/269). "The W-14 canal is a natural creek". But in file "..Vol1_MainReport.." at pdf pg 99/126: "The W-14 canal was built in the 1940's by the Louisiana office of Public Works.."

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

See comment #4348502. "Natural creek" was revised to "man-made" creek".

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4354951	Civil	n/a'	n/a	n/a
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(Document Reference: [Vol1_MainReport](#))

file: "..Vol1_MainReport.." page 25 (pdf pg 36/126) text: "pathogenic bacteria could be exposed to humans", should be: "humans could be exposed to pathogenic bacteria".

Submitted By: [Paul Oakland](#) (504-862-2949). Submitted On: 30-Dec-11

1-0 Evaluation Concurred

Revisions completed 1/5/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 05-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 09-Jan-12

Current Comment Status: **Comment Closed**

4369050	Operations	n/a'	n/a	n/a
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Operations Division has completed review of the subject Draft 533d report and has no additional comments.

Submitted By: [Steven Schinetsky](#) ((504) 862-2343). Submitted On: 09-Jan-12

1-0 Evaluation Concurred
Comment acknowledged.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 10-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Steven Schinetsky](#) ((504) 862-2343) Submitted On:
26-Jan-12

Current Comment Status: **Comment Closed**

4370694 Environmental n/a' n/a n/a

In the Problem Identification section, Environmental and Natural Resources, Wildlife, page 26, please spell out the Modified Charleston Method prior to using the initials MCM.

Submitted By: [Joseph Musso](#) (504-862-2280). Submitted On: 10-Jan-12

1-0 Evaluation Concurred
Revisions completed 1/11/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 11-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 08-Feb-12

Current Comment Status: **Comment Closed**

4370698 Environmental n/a' n/a n/a

In the Recommended Plan section, Plan Description, page 49, please remove the spelled out version of Modified Charleston Method and just use the initials MCM.

Submitted By: [Joseph Musso](#) (504-862-2280). Submitted On: 10-Jan-12

1-0 Evaluation Concurred
Revisions completed 1/11/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 11-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 08-Feb-12

Current Comment Status: **Comment Closed**

4370705 Environmental n/a' n/a n/a

In the Recommend Plan section, Social, Environmental, HTRW, and Public Interest Effects section, page 54, please remove the spelled out version of Modified Charleston Method and use only the initials MCM.

Submitted By: [Joseph Musso](#) (504-862-2280). Submitted On: 10-Jan-12

1-0 Evaluation Concurred
Revisions completed 1/11/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 11-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 08-Feb-12
Current Comment Status: **Comment Closed**

4370719	Environmental	n/a'	n/a	n/a
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In the SEA, please add the following paragraph as the last paragraph under Relevant Resources introduction section, page 14 of the SEA: Though technically not a resource, noise impacts were considered. It was determined that the impacts from construction-related noise will be localized, temporary, and short-lived. Best management practices to reduce noise and the subsequent impacts will be implemented.

Submitted By: [Joseph Musso](#) (504-862-2280). Submitted On: 10-Jan-12

1-0 Evaluation Concurred
Revisions completed 1/11/12.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 11-Jan-12

1-1 Backcheck Recommendation Close Comment
Closed without comment.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 08-Feb-12
Current Comment Status: **Comment Closed**

4370793	Structural	n/a'	n/a	n/a
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On page 49 of Vol 1 main report (page 60 of the PDF) it is stated at the bottom of the first paragraph that the improvements to the Robert detention pond include a weir North of Robert Boulevard, but then in the next sentences it talks about 3 weirs. It seems confusing and that the first bit about the 1 weir could be deleted. The drains should also be called out as 30" BCCMP as called out on the drawings and not 24" RCP.

Submitted By: [Jennifer Wedge](#) (504-862-1664). Submitted On: 10-Jan-12

1-0 Evaluation Concurred

Rock Island plans, based on the SA42 alternative called for one concrete weir with a 24-inch RCP drain. The reformulated plan envisages rehabilitating the three existing weirs shown in Burk-Kleinpeter Inc plans and replacing the two existing culverts with 24-inch RCPs. These features are the ones modeled in RAS.

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 20-Jan-12

1-1 Backcheck Recommendation Close Comment

The write up should just be consistent about what it called for.

Submitted By: [Jennifer Wedge](#) (504-862-1664) Submitted On: 07-Feb-12

Current Comment Status: **Comment Closed**

4370796	Structural	n/a'	n/a	n/a
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Same issue with the mention of 1 and then 3 weirs at the Robert pond on page 91 of the main report PDF. Also the invert of the drains is different in this paragraph (+4.5) than what is stated elsewhere (+1.5). The drains should also be called out as 30" BCCMP as called out on the drawings and not 24" reinforced concrete pipes.

Submitted By: [Jennifer Wedge](#) (504-862-1664). Submitted On: 10-Jan-12

1-0 Evaluation Concurred

The existing 30-inch BCCMP drains with invert elevation of +4.5' would be replaced by 24-inch RCPs at the same elevation as the bottom of the proposed Roberts pond excavation (+1.5').

Submitted By: [Joseph Diaz](#) (504-862-1457) Submitted On: 20-Jan-12

1-1 Backcheck Recommendation Close Comment

Submitted By: [Jennifer Wedge](#) (504-862-1664) Submitted On: 07-Feb-12

Current Comment Status: **Comment Closed**

4370797	Structural	n/a'	n/a	n/a
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On page 97 of the main report PDF, why are there concrete trapezoidal section shown in figure 9? We are not constructing those.

Submitted By: [Jennifer Wedge](#) (504-862-1664). Submitted On: 10-Jan-12

1-0 Evaluation For Information Only

The figures are for informational purposes only to show the shape of the canal after it is enlarged.

Submitted By: [Joseph Musso](#) (504-862-2280) Submitted On: 08-Feb-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Jennifer Wedge](#) (504-862-1664) Submitted On: 06-Mar-12

Current Comment Status: **Comment Closed**

4370800 Structural n/a' n/a n/a

On page 213 of the appendix pdf, in the Robert Detention pond paragraph a sentence about the 2 pipe culverts with flap gates to drain the pond back to the W-14 should be mentioned. It is mentioned in the main part of the report.

Submitted By: [Jennifer Wedge](#) (504-862-1664). Submitted On: 10-Jan-12

1-0 Evaluation Concurred

Sentence will be added to Robert Detention pond paragraph on page 213 of appendix pdf

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 20-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Jennifer Wedge](#) (504-862-1664) Submitted On: 26-Jan-12

Current Comment Status: **Comment Closed**

4370802 Structural n/a' n/a n/a

The boring data is repeated in annex 3 and annex 4.

Submitted By: [Jennifer Wedge](#) (504-862-1664). Submitted On: 10-Jan-12

1-0 Evaluation Concurred

Boring data will be deleted from Annex 4.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Open Comment

Disregard previous comment. Boring data will remain in both annexes

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-2 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Jennifer Wedge](#) (504-862-1664) Submitted On: 07-Feb-12

Current Comment Status: **Comment Closed**

4372801 Geotechnical n/a' n/a n/a

Volume 1, Plate 3 and Volume 2, Annex 1, Plates 1 thru 5: in the legend, should "Earthen Trapezoidal Channel" be "Clearing and Grubbing of Trapezoidal Section" or "Improvement to Trapezoidal Section"?

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation For Information Only

The legend designation for "Earthen Trapezoidal Channel" is correct and will not be changed as suggested by commenter.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Open Comment

On page 48 of Volume 1 Main Report, 2nd subparagraph stated the clearing and snagging, and clearing and grubbing to reshape the canal section.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 24-Jan-12

1-2 Backcheck Recommendation Open Comment

Clearing and snagging will be performed from I-12 to Fremaux Ave. This is depicted on the plates using the "clear and snag" legend item. Construction of the 10' earthen trapezoidal section from Fremaux Ave and Daney Street consists of clearing and grubbing and reshaping the existing canal. This is depicted using the "earthen trapezoidal channel" legend item.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Feb-12

1-3 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 09-Feb-12

Current Comment Status: **Comment Closed**

4372804	Geotechnical	n/a'	n/a	n/a
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Volume 2, Appendix C, Geotechnical Investigation, General (page 75): it is not clear when the work on the additional boring(s) will be performed.

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation For Information Only

Paragraph indicates that "additional borings will be necessary prior to the detailed design of project features." This will be accomplished during PED.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation **Close Comment**

Closed without comment.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 24-Jan-12

Current Comment Status: **Comment Closed**

4372807

Geotechnical n/a'

n/a

n/a

Volume 2, Appendix C, Project Design, W-14 Canal Improvements Design (page 76): "preliminary designs" should be presented. Also, the seepage analysis was not found in Annex 3.

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation **Concurred**

Preliminary designs for the project are located in Volume 2, Appendix C, Annex 4 - 8. Sentence regarding seepage analysis will be deleted as it refers to the 30' & 45' concrete channels that were to be constructed in the \$220M project.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation **Open Comment**

The subparagraph is under the paragraph on Geotechnical Investigations. And the sentence "The laboratory tests results for borings SLD-1U to SLD-6U were used for the preliminary designs of the project" gives the impression of a preliminary geotechnical design (slope stability). Also, Annex 4 is titled "Project plates – 10' trapezoidal channel and Florida Ave bridge" but it includes only the cover drawing and index drawing of the project, the boring locations, and borings SLD-1U and SLD-2U. Annexes 5 and 6 are the as-builts. Annex 8 is the relocation maps. Only Annex 7 is on Robert Road detention pond control structure project plans; borings B-1 and B-2 should be included in Annex 4 with the other soil borings. Please add the attached old slope stability analysis.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 24-Jan-12

(Attachment: [Slidell.dgn](#))

1-2 Backcheck Recommendation **Open Comment**

It was brought to our attention that some of the boring logs were missing from Annex 3. See revised Annex 3 in the attached file to determine if all necessary geotechnical info is included. I do not have the capability of opening the slidell.dgn file that you attached. Can that file be provided to me in pdf.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Feb-12

(Attachment:

[W-14_Canal_533\(d\)_Vol_II_Annex_1-_8_\(revised_17Jan12\).pdf](#))

1-3 Backcheck Recommendation Open Comment

Please include the attached pdf file.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 09-Feb-12
(Attachment: [Slidell.pdf](#))

1-4 Backcheck Recommendation Close Comment

Slope stability analysis plate will be added to report

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 22-Feb-12

Current Comment Status: **Comment Closed**

4372808 Geotechnical n/a' n/a n/a
Volume 2, Appendix C, Project Design, Bridge Replacement Design (page 76): the design should be presented.

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation For Information Only

Bridge Design is presented in Volume 2, Appendix C, Annex 4.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Open Comment

The subparagraph is under the paragraph on Geotechnical Investigations. And the sentence "The laboratory tests results were used for the designs of the Florida Avenue bridge replacement (i.e. project relocations) part of the project" gives the impression of a geotechnical design (pile capacity). Also, Annex 4 is titled "Project plates – 10' trapezoidal channel and Florida Ave bridge" but it includes only the cover drawing and index drawing of the project, the boring locations, and borings SLD-1U and SLD-2U.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 24-Jan-12

1-2 Backcheck Recommendation Open Comment

Annex 4 was revised to include all project plates. See file attached to Comment 4372807 to determine if all necessary information is included as needed.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 08-Feb-12

1-3 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 09-Feb-12

Current Comment Status: **Comment Closed**

4372809 Geotechnical n/a' n/a n/a

Volume 2, Annex 1, Plates 2 thru 5: there appears to have too many soil borings.

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation Concurred

Plates 2 thru 5 will be revised to reflect six soil borings

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 20-Jan-12

Current Comment Status: **Comment Closed**

4372811	Geotechnical	n/a'	n/a	n/a
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Volume 2, Annex 3: the plates for the soil borings SLD-4U thru SLD-6U should be shown.

Submitted By: [Bich Quach](#) (504-862-1504). Submitted On: 11-Jan-12

1-0 Evaluation Concurred

Soil Borings SLD-4U - SLD-6U have been added to Annex 3.

Submitted By: [Donna Urban](#) (504-862-1249) Submitted On: 17-Jan-12

1-1 Backcheck Recommendation Close Comment

Closed without comment.

Submitted By: [Bich Quach](#) (504-862-1504) Submitted On: 20-Jan-12

Current Comment Status: **Comment Closed**

**4. Supplemental Environmental Assessment #409A Agency
Technical Review**

Independent Technical Review Checklist -PDC-UDC

EA Number SEA#409A

Title Supplemental Environmental Assessment, Southeast Louisiana Urban Flood Control Project W-14 Drainage Canal, Slidell Area

Task	Addressed	Not Addressed	N/A	Remarks
Was coordination with OD-S, State, local, and Federal agencies conducted?	X			
Has the no-action plan been addressed?	X			
Has the environmental setting been described?	X			
Have the assumptions and rationale for the without-project conditions been stated?	X			
Have indirect project impacts been addressed?	X			
Has a Cumulative Impacts section been included?	X			
Has mitigation of adverse effects been considered?	X			Mitigation plan and credits worksheet are included as an Appendix to the plan and not submitted for review.
Have beneficial and adverse effects been evaluated for the selected plan and alternatives?	X			
Does the EA conform to the sample EA format?	X			
Was an Endangered Species BA prepared to assess impacts, and coordinated with NMFS and USFWS?	X			Concurrence with "not likely to adversely affect" on 12 October 2011.
Was there coordination with USFWS? Was a Fish and Wildlife CAR or PAL prepared?	Partial			Coordination initiated with FWCA report generated, no response from USFWS at time of review, but report will be updated when this step is accomplished, previous concurrence received on 07 July 2009.
Were impacts to prime and unique farmlands addressed?			X	
Was a CIH investigation performed?	X			
Was a Phase I HTRW assessment performed? Depending on the results, has a Phase II HTRW been scoped?	X			Phase I completed on 22 August 2008/Field inspection on 12 September 2011. Limited Phase II conducted November 2008.
Was avoidance of potential HTRW problems incorporated into alternative plans?	X			Dredged material to be placed in appropriate landfill.
Was a Coastal Zone Consistency Determination prepared?			X	
Was a 404(b)(1) Evaluation prepared?	X			Signed on 14 July 2009, updated water quality certification received 01 November 2011.
Was EFH evaluated?	X			
Were Air Quality impacts evaluated?	X			Project located in an attainment area for designated priority pollutants and actions under <i>de minimus</i> limits.
Was environmental input provided to the PM for report?	X			
Was the DEA submitted to the PM and OC for review?	Partial			Review to occur after ITR.
Was a Louisiana Scenic Rivers Permit request prepared?			X	

Reviewer Signature PIGOTT, KEVIN R. 1270059240
 TR Supervisor Initials WAS
 EM/TM Supervisor Initials AB

Date 14 November 2011
 Draft X Final _____
 Draft _____ Final X

Independent Technical Review Checklist -PDC-UDC

EA Number SEA#409A

Title Supplemental Environmental Assessment, Southeast Louisiana Urban
Flood Control Project W-14 Drainage Canal, Slidell Area

Task	Addressed	Not Addressed	N/A	Remarks
Was a land-use history performed?	X			
Was a literature and records review completed including consultation of the Louisiana Division of Archaeology's site file database, site maps, and survey maps?	Partial			SHPO concurrence being coordinated at time of review. No concurrence received as of 9 Nov 2011, but placeholder in document noting this section will be updated when received SHPO clearance. Previous no effect concurrence received on 07 October 2008.
Has an on-site inspection or pedestrian overview been completed?	X			
Has Louisiana's Comprehensive Archeological Plan been consulted?	X			
Have cultural resources been identified and evaluated?	X			Cultural Resources Investigation conducted in 2008.
Has a mitigation strategy been designed to meet the requirements of Section 106 of the National Historic Preservation Act?	X			
Have the necessary cultural resource studies been conducted in accordance with the National Historic Preservation Act and other applicable cultural resources laws and regs?	Partial			Previous SHPO no effect concurrence from 07 October 2008. SHPO concurrence being coordinated at time of review. No concurrence received as of 9 Nov 2011, but placeholder in document noting this section will be updated when received SHPO clearance.
Have Native American trust assets been addressed.	X			
Has coordination with Native Americans required by the Native American Graves Protection and Repatriation Act of 1990 been completed?	X			
Have copies of final cultural resources reports been furnished to the SHPO and appropriate organizations?	X			
Have the necessary recreational and aesthetic studies and agency coordination been conducted in accordance with the provisions of FPWRA of 1965; WRDA of 1986; the LAWCON Fund Act of 1965; Flood Control Act of 1944, and appropriate Corps regulations?	X			
Has recreational or aesthetic development been documented through supply and demand analysis?	X			
If recreation benefits are claimed, is an adequate evaluation of the competing facilities and their existing and expected use with and without the proposed project included?			X	Recreational facilities as well as other residential/commercial properties would benefit from flood risk reduction.
Have appropriate NED recreation unit day values been determined via Economic Guidance Memorandum for the current fiscal year?			X	

Reviewer Signature PIGOTT, KEVIN, R. 1270059240

Date 14 November 2011

TR Supervisor Initials MRJ

Draft X Final

EM/TM Supervisor Initials RB

Draft Final X