**WRRDA 7001 Submissions Package**

**U.S. Army Corps of Engineers**

Proposal Name: 533D Report W-14 Modification

Submission Date: 09/19/2016

Proposal ID Number: b0d58c6e-9d74-4d3f-b09c-9ec71e3c8949

Purpose of Proposal: This report presents the results of studies to determine the feasibility of additional flood protection features for the W-14 Canal basin in St. Tammany Parish as part of the Southeast Louisiana Project (SELA). The SELA project area includes Jefferson, Orleans, and St. Tammany Parishes. Improvements presented herein include providing flood protection for the City of Slidell located in St. Tammany Parish. The W-14 Basin is located in the city of Slidell, LA, and comprises approximately 5,500 acres.

Implementing the plan proposed in this 533(d) report would improve flood protection for the W-14 Canal basin, Southeast Louisiana Project. The recommended plan would provide the desired flood reduction levels for a 10-year flood, which means the flood protection has a 10 percent chance of being equaled or exceeded in any given year, and include improvements to the W-14 Canal. The improvements consists of 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.

*1. Administrative Details*

## Proposal Name: 533D Report W-14 Modification

## by Agency: St. Tammany Parish Government

## Locations: LA

## Date Submitted: 09/19/2016

## Confirmation Number: b0d58c6e-9d74-4d3f-b09c-9ec71e3c8949

***Supporting Documents***

| File Name | Date Uploaded |
|---|---|
| 533D Report W14 Modification Maps.pdf | 09/19/2016 |
| 533D Report W14 Cost .pdf | 09/19/2016 |
| 533D Report W14 Modiciaton Full Report.pdf | 09/19/2016 |
| 533D Report W14 Support Letter.pdf | 09/19/2016 |

***2. Provide the name of the primary sponsor and all non-Federal interests that have contributed or are expected to contribute toward the non-Federal share of the proposed feasibility study or modification.***

| **Sponsor** | **Letter of Support** |
|---|---|
| St. Tammany Parish Government(Primary) | The St. Tammany Parish Administration is in full support of this project and will provide all necessary resources to ensure that it is completed. |

***3. State if this proposal is for a feasibility study, a modification to an authorized USACE feasibility study or a modification to an authorized USACE project. If it is a proposal for a modification, provide the authorized water resources development feasibility study or project name.***

[x] Modification to an Authorized USACE Feasibility Study : Southeast Louisiana Urban Flood Control Project W-14 Canal Improvements

***4. Clearly articulate the specific project purpose(s) of the proposed study or modification. Demonstrate that the proposal is related to USACE mission and authorities and specifically address why additional or new authorization is needed.***

This report presents the results of studies to determine the feasibility of additional flood protection features for the W-14 Canal basin in St. Tammany Parish as part of the Southeast Louisiana Project (SELA). The SELA project area includes Jefferson, Orleans, and St. Tammany Parishes. Improvements presented herein include providing flood protection for the City of Slidell located in St. Tammany Parish. The W-14 Basin is located in the city of Slidell, LA, and comprises approximately 5,500 acres.

Implementing the plan proposed in this 533(d) report would improve flood protection for the W-14 Canal basin, Southeast Louisiana Project. The recommended plan would provide the desired flood reduction levels for a 10-year flood, which means the flood protection has a 10 percent chance of being equaled or exceeded in any given year, and include improvements to the W-14 Canal. The improvements consists of 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.

***5. To the extent practicable, provide an estimate of the total cost, and the Federal and non-Federal share of those costs, of the proposed study and, separately, an estimate of the cost of construction or modification.***

| | **Federal** | **Non-Federal** | **Total** |
|---|---|---|---|
| **Study** | $0 | $0 | $0 |
| **Construction** | $21,159,017 | $0 | $21,159,017 |

## Explanation (if necessary)

The project construction cost will be $21,159,017. The soft cost (engineering, permitting, etc.) is $1,590,497. The total cost is $22,749,514.

***6. To the extent practicable, describe the anticipated monetary and nonmonetary benefits of the proposal including benefits to the protection of human life and property; improvement to transportation; the national economy; the environment; or the national security interests of the United States.***

The total first cost of the recommended plan for the W-14 Canal Improvements project is $21,952,440. The total average annual cost for the plan is estimated to be $1,132,000. Annual operation, maintenance, repair, replacement, and rehabilitation costs, which is a 100% non-Federal cost and obligation, total $31,600. The costs are based on October 2011 price levels at an interest rate of 4 percent with a period of analysis of 50 years. The equivalent average annual benefits are estimated to be $1,759,000. The benefit to cost ratio for the W-14 Canal Improvements project is 1.55 to 1. The annual net benefits, the difference in equivalent annual benefits and annual costs, are $627,000. The total project cost estimate, fully funded through the period of construction, is $22,749,514. Congress typically apportions cost share obligations for flood control projects on a 75% Federal – 25% non-Federal basis, although recent SELA appropriations have been made on a 65% Federal – 35% non-Federal basis. The non-Federal project partner is the Coastal Protection and Restoration Authority of Louisiana. St. Tammany Parish Government will be the CPRA Authorized Agent.

***7. Does local support exist? If 'Yes', describe the local support for the proposal.***

[x] Yes

## Local Support Description

The St. Tammany Parish Administration is in full support of this project and will provide all necessary resources to ensure that it is completed.

***8. Does the primary sponsor named in (2.) above have the financial ability to provide for the required cost share?***

[x] Yes

# Map Document

(This is as uploaded, a blank page will show if nothing was submitted)

# 533D Report W14 Modification Maps.pdf

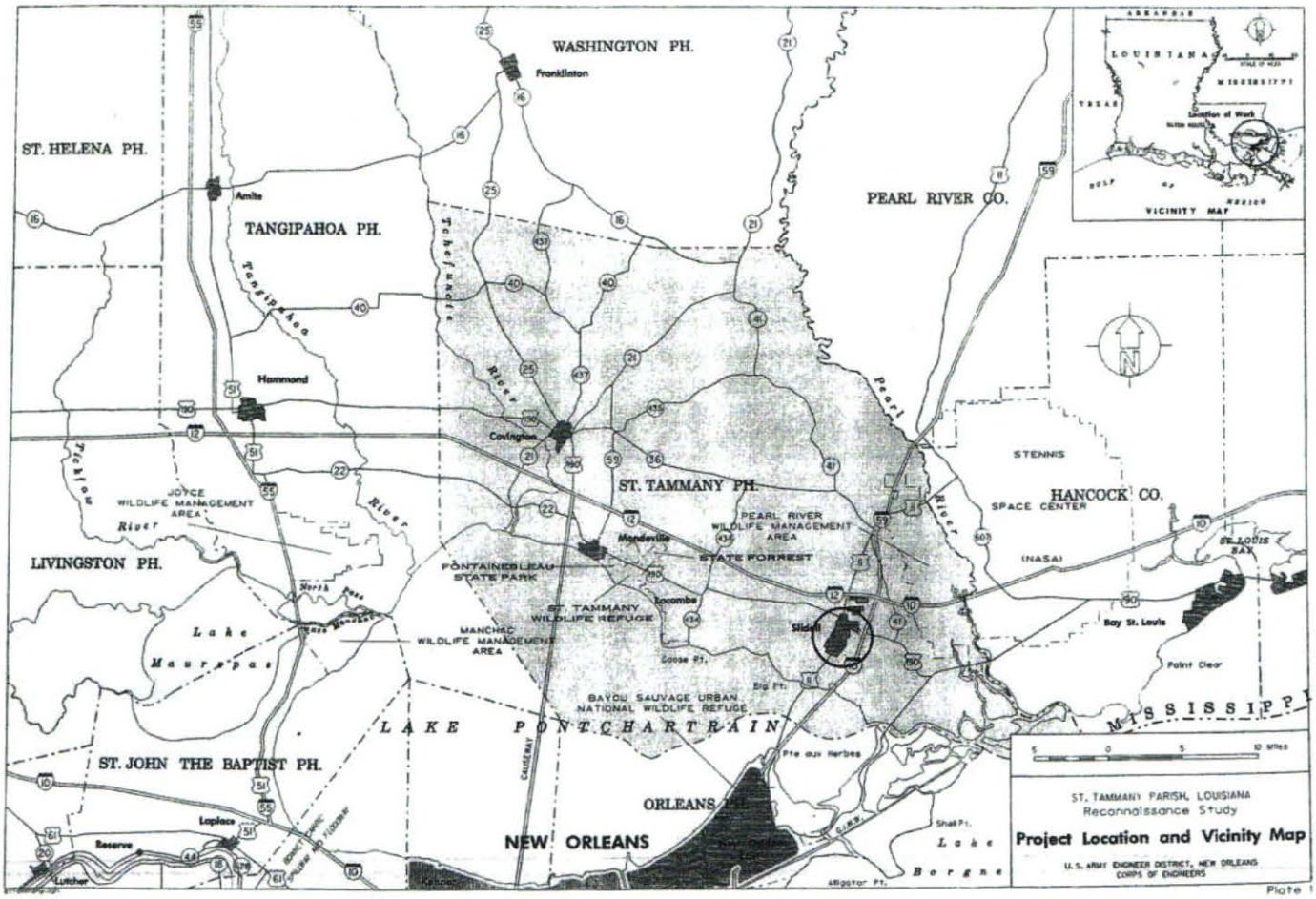

WASHINGTON PH.
Franklinton
ST. HELENA PH.
Amite
TANGIPAHOA PH.
PEARL RIVER CO.
Tchefuncte River
Tangipahoa River
Hammond
Covington
Pearl River
STENNIS
SPACE CENTER
HANCOCK CO.
ST. TAMMANY PH.
JOYCE WILDLIFE MANAGEMENT AREA
Mandeville
PEARL RIVER WILDLIFE MANAGEMENT AREA
STATE FORREST
(NASA)
LIVINGSTON PH.
FONTAINEBLEAU STATE PARK
Lacombe
ST. TAMMANY WILDLIFE REFUGE
Slidell
Bay St. Louis
MANCHAC WILDLIFE MANAGEMENT AREA
Lake Maurepas
Goose Pt.
Big Pt.
Point Clear
BAYOU SAUVAGE URBAN NATIONAL WILDLIFE REFUGE
LAKE PONTCHARTRAIN
MISSISSIPPI
ST. JOHN THE BAPTIST PH.
Pte aux Herbes
CAUSEWAY
ORLEANS PH.
Laplace
Reserve
NEW ORLEANS
Shell Pt.
Lake Borgne
Alligator Pt.
Lutcher
LOUISIANA
VICINITY MAP
Location of Work
ST. TAMMANY PARISH, LOUISIANA
Reconnaissance Study
Project Location and Vicinity Map
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

Plate 1

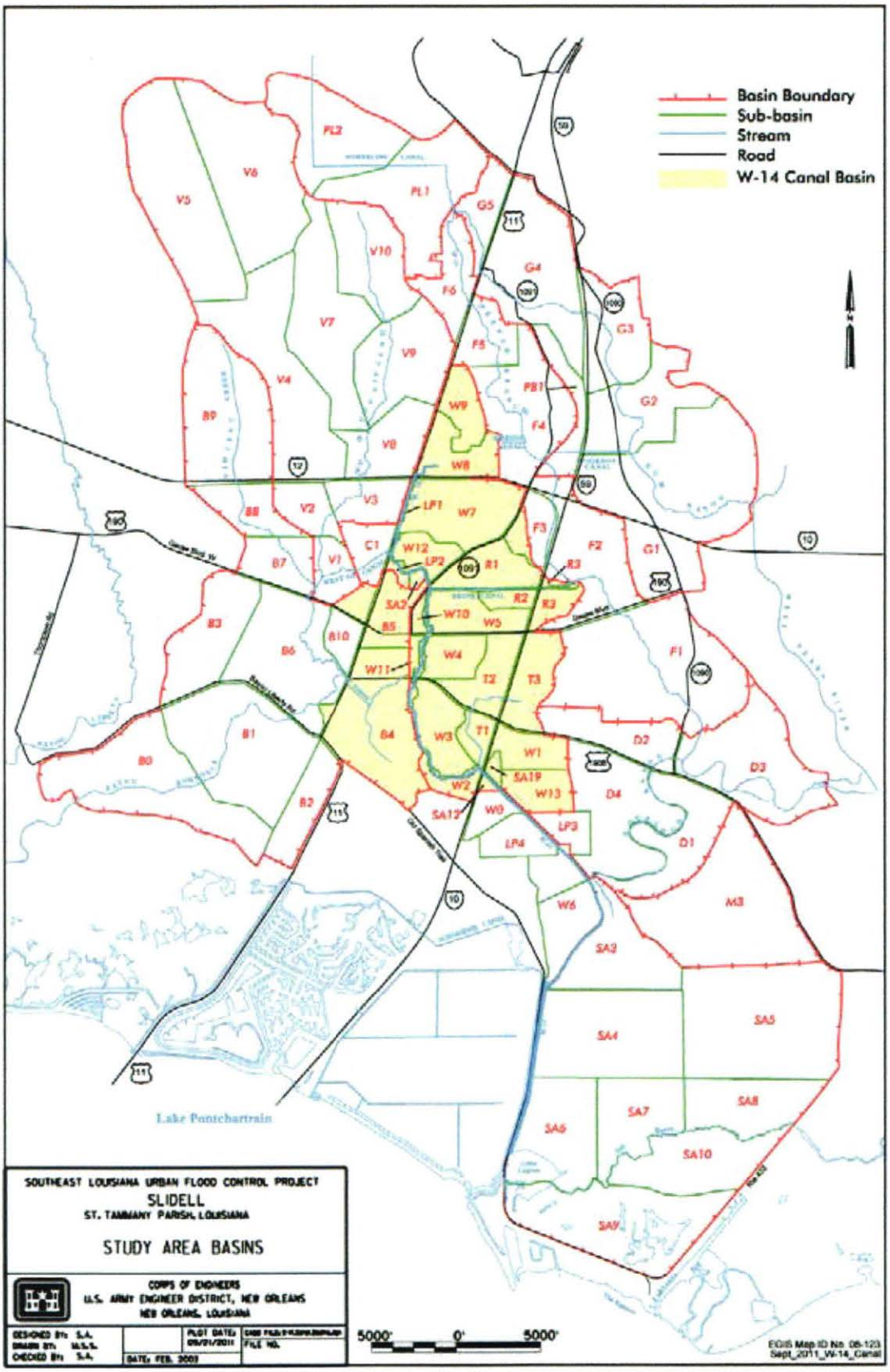
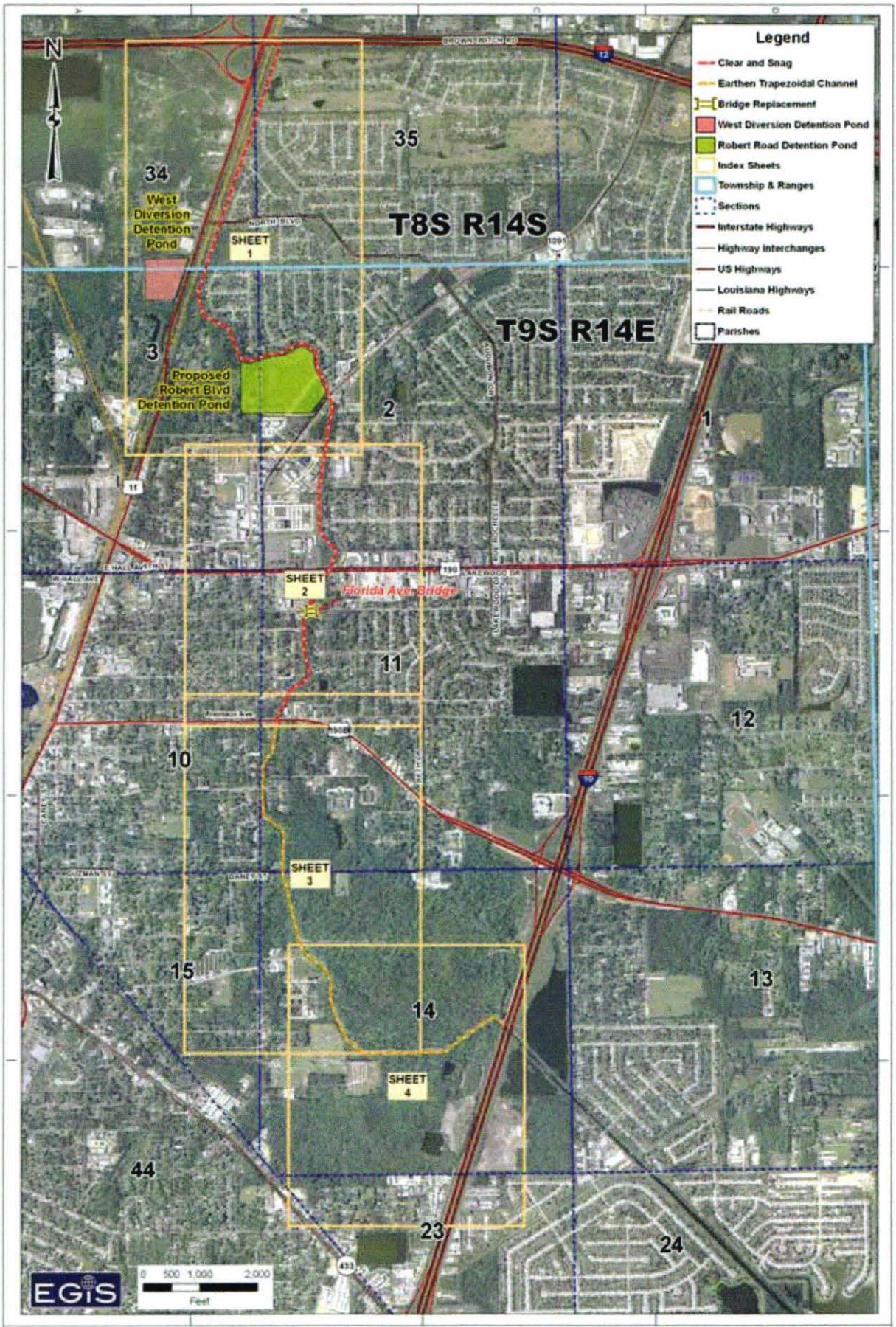

Basin Boundary
Sub-basin
Stream
Road
W-14 Canal Basin
Lake Pontchartrain
SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
SLIDELL
ST. TAMMANY PARISH, LOUISIANA
STUDY AREA BASINS
CORPS OF ENGINEERS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
NEW ORLEANS, LOUISIANA
5000' 0' 5000'
EGIS Map ID No. 08-123
Sept_2011_W-14_Canal

PLATE 2

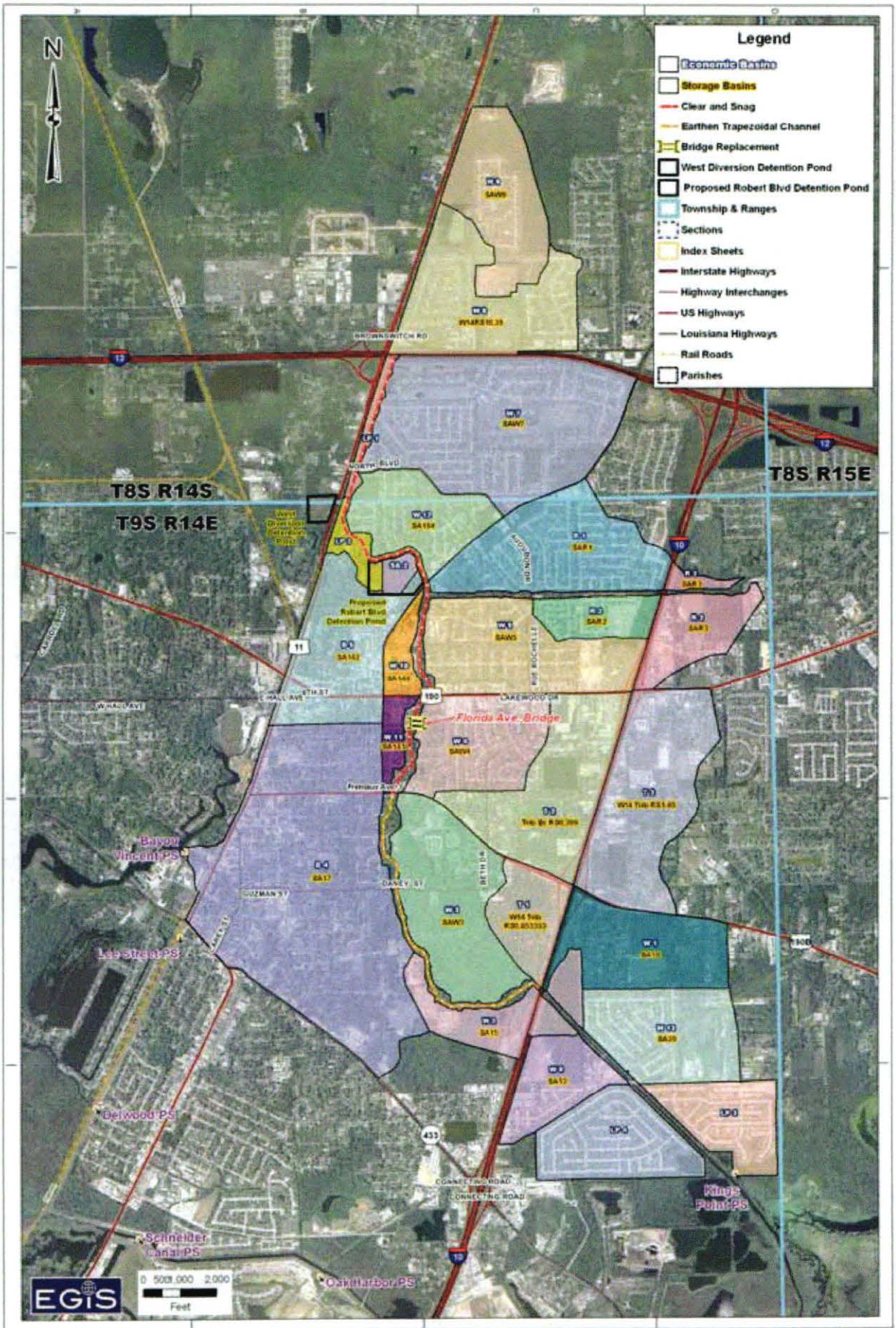



SELA, St. Tammany Parish
W-14 Canal Improvements
Slidell, Louisiana

SHEET IDENTIFICATION NUMBER
DWG 1 OF 5

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

Job No. EGIS-08-123




SELA, St. Tammany Parish
W-14 Canal Improvements
Slidell, Louisiana

SHEET IDENTIFICATION NUMBER
DWG 1 OF 5

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

Job No. EGIS-08-123

# Additional Proposal Information

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## 533D Report W14 Cost .pdf

TABLE 10

| FEDERAL AND NON-FEDERAL COST BREAKDOWN | | | |
|---|---|---|---|
| FULLY FUNDED | | | |
| Item | Federal $ | Non-Fed $ | Total $ |
| Lands & Damages | - | 7,412,824 | 7,412,824 |
| Relocations - Utilities & Bridges | - | 2,222,048 | 2,222,048 |
| Channels & Canals | 3,611,207 | - | 3,611,207 |
| Floodway Control & Diversion Structure | 6,639,470 | - | 6,639,470 |
| PED | 1,273,467 | - | 1,273,467 |
| Construction Mgmt | 1,590,497 | - | 1,590,497 |
| Cash Contribution (5%) | (1,137,476) | 1,137,476 | |
| Additional Cash or WIK | - | - | - |
| Total | 11,977,166 | 10,772,348 | 22,749,514 |

TABLE 13
W-14 CANAL EXPENDITURE SCHEDULE
FULLY FUNDED
Current 2011 Price Level - Base Year 2016

| Item # | Feature of Work | FY2013 | FY 2014 | FY 2015 | FY 2016 | TOTAL |
|---|---|---|---|---|---|---|
| 1 | 09 - 10' Channel Improv | | 399,575 | | | 399,575 |
| 2 | 09 - 40' Channel Improv | | 2,959,512 | | | 2,959,512 |
| 3 | 09 -Clear and De-Snag Channel | | 252,120 | | | 252,120 |
| 4 | 15 - Robert Blvd Detention Pond & Weir | | 1,660,356 | 1,660,356 | 830,178 | 4,150,891 |
| 5 | 15 - West Diversion Pond & Weir | | 2,488,579 | | | 2,488,579 |
| 6 | 01 - Real Estate | 3,706,412 | 3,706,412 | | | 7,412,824 |
| 7 | 02 - Relocations | | 169,692 | 169,692 | 84,846 | 424,229 |
| 8 | 02 - Florida Avenue Bridge | | 898,910 | 898,910 | | 1,797,819 |
| 9 | 30 - PED | 318,367 | 318,367 | 318,367 | 318,367 | 1,273,467 |
| 10 | 31 - Construction Mgmt | | 636,199 | 636,199 | 318,099 | 1,590,497 |
| | TOTAL | 4,024,779 | 13,489,721 | 3,683,523 | 1,551,490 | 22,749,514 |

# Additional Proposal Information

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# 533D Report W14 Modiciaton Full Report.pdf

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

## SECTION 533(D) REPORT

## VOLUME 1

## MARCH 2012

US Army Corps of Engineers
BUILDING STRONG®

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

## SECTION 533(D) REPORT

**VOLUME INDEX**

**VOLUME 1**

MAIN REPORT AND
ENVIRONMENTAL ASSESSMENT

**VOLUME 2**

| | |
|---|---|
| APPENDIX A | ECONOMICS |
| APPENDIX B | ENVIRONMENTAL SUPPORTING DOCUMENTATION |
| APPENDIX C | ENGINEERING INVESTIGATIONS |
| APPENDIX D | REAL ESTATE PLAN |
| APPENDIX E | TECHNICAL REVIEW SUMMARY |

**APPENDIX C ANNEX 1 – 8**

ANNEX 1: PROJECT MAPS
ANNEX 2: GEOLOGY DATA
ANNEX 3: GEOTECHNICAL DATA
ANNEX 4: PROJECT PLATES – 10’ TRAPEZOIDAL CHANNEL AND FLORIDA AVENUE BRIDGE
ANNEX 5: 40’ TRAPEZOIDAL CHANNEL – AS BUILTS
ANNEX 6: WEST DIVERSION DETENTION POND – AS BUILTS
ANNEX 7: ROBERT ROAD DETENTION POND CONTROL STRUCTURE PROJECT PLANS
ANNEX 8: RELOCATION MAPS

**APPENDIX C ANNEX 9**
MICRO-COMPUTER AIDED COST ESTIMATING SYSTEM (MCACES) COST ESTIMATE

## Executive Summary

This report presents the results of studies to determine the feasibility of additional flood protection features for the W-14 Canal basin in St. Tammany Parish as part of the Southeast Louisiana Project (SELA). The SELA project area includes Jefferson, Orleans, and St. Tammany Parishes, see Plate 1. Improvements presented herein include providing flood protection for the City of Slidell located in St. Tammany Parish. St. Tammany Parish is bounded by Lake Pontchartrain to the south, the state of Mississippi to the east, Washington Parish to the north, and Tangipahoa Parish to the west. The W-14 Basin is located in the city of Slidell, LA, and comprises approximately 5,500 acres.

Between 1978 and 1998, Orleans, Jefferson, and St. Tammany Parishes experienced numerous rainfall flooding events. Flooding occurs when outdated and inadequate urban drainage facilities cannot manage rainwater run-off from less frequent storms. The Federal Emergency Management Agency paid claims totaling over $814 million for this period. Devastating (and record) flooding due to torrential rainfall occurred May 8 through May 10, 1995. During this event, 6-hour rainfall amounts averaging 12 inches caused extensive flooding throughout the area. Seven lives were lost and over 35,000 homes were flooded, along with thousands of businesses and public facilities. There was significant street and highway damage. Estimated flood damages reported for the May event total about $1 billion for the three parishes.

As a result of the extensive flooding in May 1995, Congress authorized the Southeast Louisiana (SELA) Project with enactment of Section 108 of the Energy and Water Development Appropriations Act for Fiscal Year 1996 (EWDA 1996) and Section 533 of the Water Resources Development Act of 1996 (WRDA 1996), as amended, to provide for flood control and improvements to rainfall drainage systems in Jefferson, Orleans, and St. Tammany Parishes, Louisiana, in accordance with the following reconnaissance reports of the New Orleans District Engineer: Jefferson and Orleans Parishes, Louisiana, Urban Flood Control and Water Quality Management, July 1992; Tangipahoa, Tchefuncte, and Tickfaw Rivers, Louisiana, June 1991; St. Tammany Parish, Louisiana, July 1996; and Schneider Canal, Slidell, Louisiana, Hurricane Protection, May 1990.

A reconnaissance study completed in July 1996 investigated potential solutions to prevent flooding caused by heavy rainfall flooding and high tides in St. Tammany Parish. Measures that were evaluated in the reconnaissance study include: diversion of flood waters; detention basins; channel enlargement; removal of channel obstructions; flood control structures; and other non-structural measures such as house raising. The W-14 Canal basin was investigated under the Slidell Area Plan, which included detention ponds, channel modifications, canal structures, bridge replacement, and the relocation of bridges and utilities.

Implementing the plan proposed in this 533(d) report would improve flood protection for the W-14 Canal basin, Southeast Louisiana Project. The recommended plan would provide the desired flood reduction levels for a 10-year flood, which means the flood protection has a 10 percent chance of being equaled or exceeded in any given year, and include improvements to the W-14 Canal. The improvements consists of 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 total first cost of the recommended plan for the W-14 Canal Improvements project is $21,952,440. The total average annual cost for the plan is estimated to be $1,132,000. Annual operation, maintenance, repair, replacement, and rehabilitation costs, which is a 100% non-Federal cost and obligation, total $31,600. The costs are based on October 2011 price levels at an interest rate of 4 percent with a period of analysis of 50 years. The equivalent average annual benefits are estimated to be $1,759,000. The benefit to cost ratio for the W-14 Canal Improvements project is 1.55 to 1. The annual net benefits, the difference in equivalent annual benefits and annual costs, are $627,000. The total project cost estimate, fully funded through the period of construction, is $22,749,514. Congress typically apportions cost share obligations for flood control projects on a 75% Federal – 25% non-Federal basis, although recent SELA appropriations have been made on a 65% Federal – 35% non-Federal basis. The non-Federal project partner is the Coastal Protection and Restoration Authority of Louisiana. St. Tammany Parish Government will be the CPRA Authorized Agent.

Since the major flood of May 1995, the public is keenly interested in the improvements to reduce flood damages in their areas. In general, these flood damages are a major disruption to the public. The recommended plan will provide flood control for the W-14 Canal basin in St. Tammany Parish and based on the Environmental Assessment, the Corps has determined the proposed action would have no significant impacts on the following resources: air quality, water quality, aquatic resources, wetlands, wildlife, threatened or endangered species or their critical habitats, socioeconomic resources, cultural resources, recreational resources, and aesthetic resources. However, approximately 19.32 acres of mixed pine/bottomland hardwood habitat would be lost due to project implementation. Mitigation would be compensated through the acquisition, management, maintenance, and monitoring of a 46-acre mitigation site, which has been coordinated with the interagency team and the non-Federal sponsor. The presently available mitigation parcel identified in the Recommended Plan is a total of approximately 52 acres. The Hazardous, Toxic, and Radioactive (HTRW) investigation through Environmental Site Assessment (ESA) of the proposed plan determined that risks of encountering HTRWs are

low. A Phase II environmental site assessment would be required to determine the potential risk of excavating sediment from the open canals.

Section 108 of EWDA 1996 and Section 533 of WRDA 1996, as amended, provide a general and continuing authorization for engineering, design, and construction of SELA projects. Accordingly, any work within the W-14 Canal basin of St. Tammany Parish that is in accordance with the St. Tammany Parish, Louisiana, July 1996 reconnaissance report, can be implemented under the existing SELA Project authority once a determination that the conditions precedent to implementation, as required by Section 533(d) of WRDA 1996, have been met. Based on the information and analysis contained in this report, the recommended plan is within the authority conferred by Section 533 of WRDA 1996 and does not require additional Congressional authorization. Approval of this report by the appropriate Corps office will signify that the conditions precedent to implementation (i.e., the work is technically sound, environmentally acceptable, and economic) have been met. Subsequent to approval of this report, a Project Partnership Agreement must be executed prior to proceeding with the work recommended in this report.

# SOUTHEAST LOUSIANA
# URBAN FLOOD CONTROL PROJECT
# W-14 CANAL IMPROVEMENTS

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Title Page

## INTRODUCTION



## PROBLEM IDENTIFICATION

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## RECOMMENDED PLAN



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## LOCAL COOPERATION



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### SUPPLEMENT



### LIST OF PLATES

## INTRODUCTION

This report, the "W-14 Canal Improvements, St. Tammany Parish, Louisiana 533d Report" ("W-14 Canal Improvements Project" and/or "533d Report"), presents the findings of a flood damage reduction study for the City of Slidell in St. Tammany Parish. This report consists of two volumes. The first volume is a presentation of the study results, including overall project formulation processes; an analysis of the environmental impacts; a summary of the economic analysis; the study recommendations; and the Environmental Assessment (EA). The second volume is a set of technical appendixes, containing technical data in support of National Environmental Policy Act of 1969 regulations (40 CFR Parts 1500-1508), ER 200-2-2, and ER 1105-2-100.

## PROJECT AUTHORITY

As a result of the extensive flooding in May 1995, Congress authorized the Southeast Louisiana (SELA) Project with enactment of Section 108 of the Energy and Water Development Appropriations Act for Fiscal Year 1996 (EWDA 1996), Public Law 104-46, and Section 533 of the Water Resources Development Act of 1996 (WRDA 1996), Public Law 104-303, as amended, to provide for flood control and improvements to rainfall drainage systems in Jefferson, Orleans, and St. Tammany Parishes, Louisiana in accordance with the following reconnaissance reports of the New Orleans District Engineer: Jefferson and Orleans Parishes, Louisiana, Urban Flood Control and Water Quality Management, July 1992; Tangipahoa, Tchefuncte, and Tickfaw Rivers, Louisiana, June 1991; St. Tammany Parish, Louisiana, July 1996; and Schneider Canal, Slidell, Louisiana, Hurricane Protection, May 1990.

Section 108 of EWDA 1996 reads as follows:

> "Sec. 108. Using $2,000,000 of the funds appropriated herein, the Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to 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, in accordance with the following reports of the New Orleans District Engineer; Jefferson and Orleans Parishes, Louisiana, Urban Flood Control and Water Quality Management, July 1992; Tangipahoa, Techefuncte and Tickfaw Rivers, Louisiana, June 1991; and Schneider Canal, Slidell, Louisiana, Hurricane Protection, May 1990. There is authorized to be appropriated $25,000,000 for the initiation and partial accomplishment of projects described in these reports. The cost of any work performed by the non-Federal interests subsequent to the above cited reports, as 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."

Section 533 of WRDA 1996 reads as follows:

"Sec. 533. SOUTHEAST LOUISIANA.

(a) FLOOD CONTROL. – The Secretary 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, in accordance with the following reports of the New Orleans District Engineer: Jefferson and Orleans Parishes, Louisiana, Urban Flood Control and Water Quality Management, July 1992; Tangipahoa, Techefuncte, and Tickfaw Rivers, Louisiana, June 1991; St. Tammany Parish, Louisiana, July 1996; and Schneider Canal, Slidell, Louisiana, Hurricane Protection, May 1990.

(b) COST SHARING. – The cost of any work performed by the non-Federal interests subsequent to the dates of the reports referred to in subsection (a) and determined by the Secretary to be a compatible and integral part of the projects shall be credited toward the non-Federal share of the projects.

(c) FUNDING. – There is authorized to be appropriated $100,000,000 for the initiation and partial accomplishment of projects described in the reports referred to in subsection (a).

(d) ADDITIONAL OBLIGATIONS. – No funds may be obligated in excess of the amount authorized by subsection (c) for the projects for flood control and improvements to rainfall drainage systems authorized by subsection (a) until the Corps of Engineers determines that the additional work to be carried out with such funds is technically sound, environmentally acceptable, and economic, as applicable."

**SOUTHEAST LOUISIANA PROJECT PURPOSE**

The Southeast Louisiana Project provides for engineering, design, and construction of projects for flood control and improvements to rainfall drainage systems in Jefferson, Orleans, and St. Tammany Parishes. (Plate 1: project location & vicinity map). The plans previously approved for construction as presented in the "Prior and Ongoing Studies, Reports, and Existing Water Projects, Southeast Louisiana," section of this report, include canal and pump station improvements for all three parishes and hurricane protection in St. Tammany Parish. The

previously approved project locations include the east bank of the Mississippi River in Orleans Parish and the east and west banks of the river in Jefferson Parish. The channel and pumping station improvements in Orleans and Jefferson Parishes support the parishes' master drainage plans and, generally, provide flood projection on a level associated with a ten-year rainfall event, while also reducing damages for larger events.

There are currently a total of seven (7) authorized SELA improvement plans in St. Tammany Parish, located in and around the communities of Slidell, Mandeville, Covington, Lacombe, and Abita Springs. Authorized improvements in St. Tammany Parish generally focus on protection from ten-year rainfall events. Plans for an urban flood protection project St. Tammany Parish have not yet been approved for implementation but include channel enlargements, bridge replacements, detention ponds, levee, floodwalls, pump stations and elevation of flood prone structures.

## STUDY PURPOSE AND SCOPE

The purpose of this 533d Report is to present the results of the Reformulated Plan for the W-14 Canal Improvements Project to determine the feasibility of providing improved flood protection to a portion of the St. Tammany Parish SELA project in accordance with Section 533(d) of WRDA 1996. The 533(d) study investigated rainfall flooding problems in the area of the W-14 Canal basin in the city of Slidell. The W-14 Canal basin location map is depicted in Plate 2.

The W-14 Canal Improvements were included in the original July 1996, St. Tammany Parish, Louisiana, Reconnaissance Study (Reconnaissance Study) as part of the Slidell Area Plan. The W-14 Canal improvements investigated during the Reconnaissance Study generally included canal improvements, detention pond creation and expansion, and bridge replacement. The W-14 Canal Improvements Project 533(d) Reformulated Plan (Plate 3: project map), is consistent with what was developed in the original 1996 Reconnaissance Study.

## REPORT AND STUDY PROCESS

This report provides the detailed findings of investigations to determine the feasibility of implementing improvements for flood damage reduction in the existing W-14 Canal drainage basin in Slidell, Louisiana. This report includes the Environmental Assessment, Real Estate Plan, Engineering Appendix, micro-computer aided cost estimating system (MCACES) cost estimate, and Economic Appendix.

The W-14 Canal Improvements Project was originally studied in Environmental Assessment (EA) #409 dated June 4, 2009. EA #409, was submitted to Federal, state and local agencies and other interested entities for review on June 10, 2009. The District Engineer signed a Finding of No

Significant Impact (FONSI), on July 27, 2009, following the review and receipt of comments. During the final technical review of the final draft W-14 Canal Improvements Section 533(d) report (May 2010), an anomaly in the economic analysis was discovered. The draft Report showed exaggerated project benefits associated with preventing damages from the 1- and 2- year rainfall events. Although initial refinements to the modeling corrected the anomalous results, further economic analysis showed a significant reduction in the anticipated benefit-cost ratio (BCR), thereby threatening the project's viability. The initial proposed project included several high cost features that provided low benefits, failing to show the requisite federal interest in the project. Consequently, reformulation of the W-14 Canal Improvements Project was necessary.

The reformulated W-14 Canal Improvements project is much smaller in scope and cost, and is consistent with the 1996 Reconnaissance Study. A Supplemental Environmental Assessment (SEA #409A), was developed to address the reformulated project. The design, real estate, cost, and environmental impacts were revised and updated. The SEA #409A was reviewed by the United States Fish and Wildlife Service (USFWS) in November 2011 to ensure the proposed action would not adversely affect any Federal listed threatened or endangered species, or their habitat. The USFWS determined that the proposed action is not likely to adversely affect those resources and issued a letter to that effect on January 9, 2012. SEA #409A has been prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA), and the Council on Environmental Quality's Regulations (40 CFR §1500-1508), as reflected in the USACE Engineering Regulation, ER 200-2-2.

The plan recommended (Recommended Plan) in this report will be submitted in accordance with ER 1105-2-100, paragraph 4-5 and Appendix G, as the studies are completed. Although the Recommended Plan does not meet the discharge flow requirements of ER 1105-2-100 (22 April 2000), Chapter 3, Section 3-3B(6), Minimum Flows, Minimum Drainage Area and Urban Drainage, which references ER 1165-2-21 (30 October 1980), Flood Damage Reduction Measures in Urban Areas, these regulations generally exclude improvements to drainage streams with flows less than 800 cubic feet per second (cfs) on the grounds that they do not provide the necessary Federal interest. Nevertheless, several other plans authorized under SELA and approved for construction by Headquarters, U.S. Army Corps of Engineers (HQUSACE), include improvements with systems less than 800 cfs, Congress has determined that there is a Federal interest in providing improvement to rainfall damage systems in these specific communities. Congress has not made an overall determination of federal interest in protecting all communities nationwide from flood as a result to rainfall. In December 1996, the ASA(CW) approved for execution project cooperation agreements for Orleans and Jefferson parishes which provide for Federal cost-sharing of improvements to rainfall drainage systems that included numerous less-than-800-cfs components. Applying the 800-cfs criterion for cost-sharing purposes is not appropriate for this SELA project.

Section 108 of EWDA 1996 and Section 533 of WRDA 1996, as amended, provide a general and continuing authorization for engineering, design, and construction of certain SELA projects. Accordingly, any work within the W-14 Canal basin of St. Tammany Parish that is determined to be in accordance with the 1996 Reconnaissance Report can be implemented under 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. The final W-14 533d report will be submitted by the New Orleans District (CEMVN) to the Mississippi Valley Division (MVD) for review and approval or further processing to HQUSACE for review and approval, as appropriate. Approval of this report by the appropriate Corps office will signify that the conditions precedent to implementation (i.e., the work is technically sound, environmentally acceptable, and economic) have been met.

## PRIOR AND ONGOING STUDIES, REPORTS, AND EXISTING WATER PROJECTS

A number of studies and reports on water resources development in the vicinity of the study area have been prepared by the U.S. Army Corps of Engineers (USACE); other Federal, state, and local agencies; research institutes; and individuals. Previous Federal and non-Federal studies have established an extensive database for this report. The more relevant studies, reports, and projects are described in the following paragraphs.

### SOUTHEAST LOUISIANA

The USACE completed a reconnaissance study, Jefferson and Orleans Parishes, Louisiana Urban Flood Control and Water Quality Management, in July 1992. The study was authorized by Senate and House resolutions to investigate rainfall flooding and water quality problems associated with storm water runoff in Jefferson and Orleans Parishes. A total of nine urban flood control plans, five in Jefferson and four in Orleans Parish, were determined to be economically feasible. This report was one of the four reports cited in Section 533 of WRDA 1996 as the basis for the SELA Project. The Jefferson Parish Council signed a feasibility cost sharing agreement (FCSA) in January 1994 to participate in a four year urban flood control feasibility study. The Sewerage and Water Board of New Orleans, the local sponsor for the Orleans Parish study, signed their FCSA in June 1994.

- The Southeast Louisiana Project, Jefferson, Orleans and St. Tammany Parishes, Technical Report was completed by the New Orleans District in April 1996 and was approved by HQUSACE in 1996. The report presents the flood control and rainfall drainage project components selected for implementation within the initial Federal funding of $25 million, authorized to be appropriated, in Section 108 of the Fiscal Year 1996 Energy and Water Development Appropriations Act. This report was one of the reports cited as a basis for the PCA

for the Jefferson Parish portion of the SELA project executed on January 16, 1997 and for the PCA for the Orleans Parish portion of the SELA project executed on January 23, 1997.

- The Southeast Louisiana Project, Orleans Parish, Technical Report was completed by the New Orleans District in May 1996 and was approved by HQUSACE in 1996. The report presents the remaining Orleans Parish project components that were economically justified in the Jefferson and Orleans Parishes Reconnaissance Study, dated July 1992. This report was also cited as a basis for the PCA for the Orleans Parish portion of the SELA project executed on January 23, 1997.

- Environmental Assessment #237 (entitled "the Southeast Louisiana Urban Flood Control, Orleans Parish Technical Report"), dated April 1996, and Environmental Assessment #239(entitled "the Southeast Louisiana Urban Flood Control, Orleans Parish Technical Report 2"), dated May 1996, addressed drainage improvements along Peoples, Dwyer Road, Oleander, and Dublin Street, Nashville, Napoleon, and General Taylor drainage canals. These assessments addressed potential impacts to the uptown area regarding improvements of box culverts along Napoleon, Nashville, and General Taylor Avenues and increased pumping capacity at Pump Station No. 1. The April 1999 SEA #239-A evaluated the potential impacts associated with canal modifications, which included larger drainage canals along South Claiborne Avenue. The September 1999 SEA #239-B evaluated the potential impacts associated with construction of four additional culverts, a pumping station, and a sluice gate to an existing pumping station in the Uptown/Oleander Subbasin. The June 1999 SEA #239-C evaluated the potential impacts associated with project modifications to drainage canals and proposed pumping stations along Florida and Peoples Avenues.

- The Southeast Louisiana Project, Jefferson Parish, Technical Report was completed by the New Orleans District in May 1996 and was approved in Headquarters in 1996. The report presents the remaining Jefferson Parish project components that were economically justified in the Jefferson and Orleans Parishes Reconnaissance Study, dated July 1992. This report was also cited as a basis for the PCA for the Jefferson Parish portion of the SELA project executed on January 16, 1997.

- A reconnaissance report on hurricane and riverine flooding in the Tangipahoa, Tchefuncte, and Tickfaw River drainage basins on the north shore of Lakes Pontchartrain and Maurepas was completed in 1991. This report covered a 2,400-square-mile area in Southeast Louisiana and South Mississippi, including portions of St. Tammany, Tangipahoa, Washington, St. Helena, and Livingston parishes in Louisiana and parts of Pike and Amite counties in Mississippi. Several St. Tammany Parish projects, including the Mandeville hurricane protection plan and improvements on Mile Branch and Ponchatoula Creek, were economically justified. This reconnaissance report

was one of the four reports cited in Section 533 of WRDA 1996 as the basis for the Southeast Louisiana Project.

- A draft reconnaissance report was prepared in May 1990, concerning hurricane protection in the vicinity of Schneider Canal in Slidell, Louisiana. An economically feasible hurricane protection plan was identified for this area of St. Tammany Parish. This reconnaissance report was one of the four reports cited in Section 533 of WRDA 1996 as the basis for the Southeast Louisiana Project. A project management plan (PMP) was developed for a Section 533(d) post-authorization change study. However, St. Tammany Parish determined that the study was too costly. Development of a less costly study was underway, however, completion of the PMP has been suspended pending finalization of the W-14 Canal 533(d) report.

- A reconnaissance report for St. Tammany Parish was completed in July 1996. The purpose of the St. Tammany Parish study was to identify other potential Federal flood control projects in addition to those previously identified through earlier studies. The study recommended structural improvements for rainfall and hurricane flooding protection for the city of Slidell, channel improvement and non-structural plans for Bayou Chinchuba in Mandeville, and non-structural plans for Abita Springs and Lacombe. Non-structural plans for Abita Springs and Lacombe will not be pursued due to the local sponsor withdrawing support. This reconnaissance report was one of the four reports cited in Section 533 of WRDA 1996 as the basis for the Southeast Louisiana Project. .

- Five reports have been approved under the authority of Section 533(d) of WRDA 1996. A brief description and status of these plans are as follows:

a. A study was performed to determine the feasibility of providing flood protection for the Peoples Avenue Subbasin of Orleans Parish, generally bounded by the Mississippi River to the south, the Inner Harbor Navigation Canal to the east, Lake Pontchartrain to the north, and the London Avenue Outfall Canal to the west. The plan includes the addition of new culverts, modifications to existing canals, and the addition of backup power for a pump station. The estimated construction cost is $70.3 million (fully funded, 2004 amount). The final report, titled *Southeast Louisiana Urban Flood Control Project, Peoples Subbasin Section 533(d) Report, Orleans Parish, Louisiana*, was approved by the Major Subordinate Command (MSC) in March 2004 and a Project Partnership Agreement was executed January 16, 2009.

b. A study was performed to determine the feasibility of providing flood protection for the Uptown Subbasin of Orleans Parish, generally bounded by the Mississippi River to the south, the 17$^{th}$ Street Canal to the west, and Pontchartrain Expressway to the north and east. The plan was developed to enhance the SELA project features currently being constructed in the subbasin and

includes approximately 35,600 linear feet of new culverts. The estimated construction cost is $146 million (fully funded, 2006 amount). The final report, titled *Southeast Louisiana Urban Flood Control Project, Uptown Subbasin Section 533(d) Report, Orleans Parish, Louisiana*, was approved by the MSC, District Support Team (DST) in October 2006 and a Project Partnership Agreement was executed January 16, 2009.

c. A study was performed to determine the feasibility of providing flood protection for the Algiers Subbasin of Orleans Parish, generally bounded on the west and north sides by the Mississippi River, by the Algiers Navigation Canal on the east, and by the Donner Outfall Canal (Donner Canal) on the south side. The plan includes adding new concrete box culverts and large catchment facilities, additional pump capacity, and subsurface drainage. The estimated construction cost is $325,264,000 (fully funded, 2010 amount). The final report, *titled Southeast Louisiana Urban Flood Control Project, Algiers Subbasin, Section 533(d) Report*, was approved by the MSC, DST in September 2011. A Project Partnership Agreement remains to be executed.

d. A study was completed to determine the feasibility of improving flood control and minimizing flood damage in the East Bank Basin of Jefferson Parish, Louisiana. The study area is bounded by on the north by Lake Pontchartrain, on the east by the Jefferson Parish/Orleans Parish political boundary, on the south by the Mississippi River, and on the west by the Jefferson Parish/St. Charles Parish political boundary. The proposed plan consists of construction of a 1200 cfs Pump Station located near the junction of Mazoue Ditch and Soniat Canal and three 84-inch discharge pipes. The entire system will be underground and the flow will be discharged into the Mississippi River. Construction cost is currently estimated at $56.7 Million (fully funded). The final report, titled *Southeast Louisiana Urban Flood Control Project, East Bank Basin Jefferson Parish, Louisiana, Section 533(d) Report*, was approved by HQ in February 2004 and a PCA was executed March 24, 2005.

e. A study was completed to determine the feasibility of improving flood control and minimizing flood damage in the East of Harvey Canal Basin of Jefferson Parish, Louisiana. The study area is bounded by the Mississippi River on the north, on the west by the Harvey Canal, on the south by Gulf Intracoastal Waterway (GIWW), and on the east by the Jefferson/ Orleans Parish political boundary. The proposed plan consists of improving Industry, Trapp, and Murphy/Gardere Canals and increasing Whitney Barataria Pump Station's capacity by 1,000 cubic feet per second (cfs) in addition to the 2,000 cfs capacity previously approved by SELA Project. The total project cost is currently estimated at $45.4 million (fully funded). The final report, titled *Southeast Louisiana Urban Flood Control Project, East of Harvey Canal Basin, Jefferson Parish, Louisiana, Section 533(d) Report,* was approved by HQUSACE in February 2004 and a PCA was executed March 24, 2005.

- In addition to the W-14 Canal Improvements study, three additional investigations are currently underway to determine the feasibility with regard to WRDA 1996 Section 533(d) of additional flood protection plans in Orleans and Jefferson Parish. A brief description and status of these additional plans are as follows:

a. A study is underway to determine the feasibility of providing flood protection for the Orleans/London Area Outfall Subbasin of Orleans Parish. The plan would afford flood protection for that area of Orleans Parish bounded on the north by Lake Pontchartrain, on the west by the 17th Street Canal, on the south by Broad Street, and on the east by the London Avenue Outfall Canal. The plan will include the addition of new pump stations and culverts and increasing the pump capacity of pumps currently in use. The plan is currently on hold, and may require reformulation, pending the outcome of the permanent outfall plan, included in the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

b. A study is underway to determine the feasibility of improving flood control and minimizing flood damage in the Hoey's Basin of Jefferson Parish, Louisiana. The study area is bounded by the 17th Street Canal to the east, by Arnoult Road to the west, by the Mississippi River to the south, and by Metairie Road to the north. The PMP is currently being revised to complete the 533(d) analysis and report.

c. A study is underway to determine the feasibility of improving flood control and minimizing flood damage in the West of Bayou Segnette Basin of Jefferson Parish, Louisiana. The basin is located on the west bank of the Mississippi River in Jefferson Parish. It is bounded by the Mississippi River to the north, Bayou Segnette to the east, Lake Cataouatche to the south, and the St. Charles Parish line to the west. The study is currently in the preliminary phase of plan development.

OTHER STUDIES AND REPORTS

- The U.S. Army Corps of Engineers completed the Southeast Louisiana Hurricane Preparedness Study in August 1994. The purpose of the study was to provide state and local emergency managers with detailed information concerning the potential levels of hurricane surge flooding in nine southeastern Louisiana parishes. Information contained in the report provides a framework within which the state and each parish can update and revise existing hurricane evacuation plans and from which operational procedures and decision guides for future hurricane threats can be developed. Information presented in the report is based on existing conditions and conditions that are expected to occur in the immediate future. No attempt was made to project future conditions.

- The Lake Pontchartrain, Louisiana, and Vicinity Hurricane Protection Project, was authorized by Public Law 89-298, 27 October 1965, house Document 231, Eighty-ninth Congress, 1st Session. The project, as originally formulated in the 1960's, involved the construction of low level levees and barrier structures in Lake Pontchartrain to provide hurricane protection in the Lake Pontchartrain Basin. In a 1977 reevaluation, the most feasible plan was determined to be a high level levee plan for the metropolitan New Orleans area that eliminated the barrier structures. The Lake Pontchartrain project currently provides a high level of hurricane protection for much of Jefferson, St. Charles, St. Bernard and Orleans parishes on the east bank of the Mississippi River. The project is now being constructed as a component of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

- The Mississippi River and Tributaries project, the comprehensive flood control project for the lower Mississippi Valley below Cairo, Illinois, has had a significant impact on the water and land resources in the project area. This project was authorized by the Flood Control Act of 1928, and subsequent amendments. Features of the project pertinent to the Jefferson Parish features of the Southeast Louisiana Project are listed below.

a. The Mississippi River levees that extend from Baton Rouge, Louisiana, to Bohemia, Louisiana, on the west bank, provide protection from the standard project flood on the Mississippi River and Tributaries system. These levees are essentially complete in the project area.

b. The Bonnet Carre' Spillway is located upstream of New Orleans, Louisiana, on the east bank of the Mississippi River in the vicinity of Norco, Louisiana. The purpose of the spillway is to divert Mississippi River flows into Lake Pontchartrain to lower flood stages on the Mississippi River in the New Orleans area. The spillway was completed in 1932.

c. Revetments and foreshore protection have been constructed along the Mississippi River in the study area. Revetments are constructed where levees or development is threatened by bank caving or where unsatisfactory alignment and channel conditions are developing. Foreshore protection is constructed where levees are threatened by the erosion of the batture. Construction of these features is continuing as needed.

- A feasibility report entitled, West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana, was published by the U. S. Army Corps of Engineers in December 1986. The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between the Harvey Canal and Westwego and down to the vicinity of Crown Point, Louisiana. The project was authorized by the Water Resources Development Act of 1986 (Public Law 99-662). The Louisiana Department of Transportation and Development and the West Jefferson Levee District are the local sponsors for the project. Construction of the project was initiated early in 1991. The project is now being

constructed as a component of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

- A feasibility report entitled, West Bank of the Mississippi River in the Vicinity of New Orleans, Louisiana (East of the Harvey Canal), was completed by the U. S. Army Corps of Engineers in August 1994. The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of metropolitan New Orleans from the Harvey Canal eastward to the Mississippi River. The project was modified to provide additional hurricane protection east of the Harvey Canal. The report also recommended the area east of the Algiers Canal provides protection for the Standard Project Hurricane (SPH). The Division Engineer's Notice was issued in September 1994, and the signed Chief of Engineer's report was issued in May 1995. Construction was initiated in FY 2000. The project is now being constructed as a component of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

- The U. S. Army Corps of Engineers prepared a reconnaissance report entitled, Lake Cataouatche, Louisiana Hurricane Protection Study in February 1992. The study investigated the feasibility of providing hurricane surge protection to that portion of the west bank of the Mississippi River in Jefferson Parish between Bayou Segnette and the St. Charles Parish line. The plan that consists of a combination levee and floodwall generally along the existing "local" Lake Cataouatche levee alignment was found to be economically justified. Due to potential impacts to the Westwego to Harvey Canal project, the study proceeded as a post authorization change (PAC). The PAC report, Westwego to Harvey Canal, Louisiana, Hurricane Protection Project, Lake Cataouatche Area, was approved by the Corps in December 1996 and authorized by Congress in WRDA 1996. Design is near complete. Construction was initiated in FY 2000. The project is now being constructed as a component of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

- The U.S. Army Corps of Engineers prepared a final feasibility report, Louisiana Coastal Area, Freshwater Diversion to Barataria and Breton Sound Basins, in September 1984. The report recommends diverting Mississippi River water near Caernarvon into the Breton Sound Basin and near Davis Pond into Barataria Basin to enhance habitat conditions and improve fish and wildlife resources. The report also recommends that the plan be implemented under the authorized Mississippi Delta Region Project, which is identical in purpose. The construction of the Caernarvon structure was completed in early 1991. Advanced engineering and design studies on the Davis Pond feature are underway. Construction of the Davis Pond Pump Station, diversion structure and west guide levee is complete.

- The Corps of Engineers prepared a final feasibility report, Mississippi-Louisiana Estuarine Areas, Louisiana and Mississippi, in April 1984. The report recommends diverting water from the Mississippi River through the Bonnet Carre spillway into Lake Pontchartrain and the Mississippi Sound to enhance habitat conditions and improve fish and wildlife resources. The diversion would

also reduce land loss and save approximately 10,000 acres of wetlands. The project is ready to begin construction and is pending approval of the local cooperation agreement by the local sponsor. Preconstruction, engineering, and design was initiated in October 1984. This project is currently inactive.

- The Barataria-Terrebonne National Estuary Program, nominated by Governor Roemer in October 1989, received funding under Section 320 of the 1987 Water Quality Act on April 20, 1990, to enhance, protect and maintain the water quality, habitat integrity and natural resources of the Estuarian Complex. The Act authorized the EPA to develop a Comprehensive Conservation and Management Plan which recommends priority corrective actions and compliance schedules addressing point and non point sources of pollution to restore and maintain the chemical, physical and biological integrity of the estuary: including restoration and maintenance of water quality, a balanced indigenous population of shellfish, fish, and wildlife, and recreational activities, and assuring that the designated uses of the estuary are protected.

- A report entitled Louisiana-Texas Intracoastal Waterway, New Orleans, Louisiana to Corpus Christi, Texas, was published as House Document No. 230, 76th Congress, 1st Session. The project provides for an inland channel, 12 feet deep and 125 feet wide from the mouth of the Rigolettes to the Sabine River and includes eight primary navigation locks and 384 miles of channel. The Harvey Lock, connecting the inland channel to the Mississippi River, was completed in 1935. The main stem of the waterway was completed to a 12-foot project depth in 1948. The Algiers Canal alternate route and the Algiers Lock were completed in 1956. The Gulf Intracoastal Waterway project was modified by the River and Harbor Act of 1962 to provide for a channel 16 feet deep by 150 feet wide between the Mississippi River and the Atchafalaya River, and 16 feet deep by 200 feet wide between the Atchafalaya River and the Sabine River.

- The New Orleans -Baton Rouge Metropolitan Water Resources Study was conducted under the urban studies program of the U. S. Army Corps of Engineers and published in September 1981. The Corps, through the urban studies program, seeks to define a broad spectrum of both short-and long-range plans for the management of urban water resources that are compatible with comprehensive urban development goals being developed for the region under study through the year 2020. The following water and related land resources were investigated in the NOBRMA study with regard to current and potential problems and needs:

1. wastewater management and water quality,
2. flood control,
3. wise use of flood plain lands,
4. storm water management,
5. environmental enhancement,
6. conservation of fish and wildlife,

7. water supply management,
8. navigation, and
9. other measures for enhancement of economic and human resources development.

The Plan Formulation Appendix to the NOBRMA report contains information on specific water resources problems and needs, the iterative process used to formulate alternative plans, and impact assessment and evaluation of plans.

- The Mississippi River-Gulf Outlet (MRGO) is a 76-mile, 36-ft deep, 500-ft wide man-made waterway authorized by the River and Harbor Act of 1956 and the Water Resources Development Acts of 1976, 1986, and 1996. Its construction was authorized by Congress to provide an emergency outlet from the Mississippi River in the interest of national defense and general commerce and to provide a safer and shorter route between the Port of New Orleans and the Gulf of Mexico. The State of Louisiana, the parishes of Orleans and St. Bernard, the Board of Commissioners of the Port of New Orleans, and the navigation industry supported construction of the MRGO. Today, there is public concern about the safety and environmental threats attributed to the MRGO. Concerns include possible increased threat of flooding due to hurricane storm surge, loss of wetlands due to erosion and salt-water intrusion. The number of deep-draft vessels utilizing the channel has decreased from its peak. In 1999 and between 2005 – 2008, USACE initiated a reevaluation study of the MRGO. The recommendation was to close the MRGO. Construction to close the main canal was completed in July 2009.

- New Orleans to Venice, Louisiana, Hurricane Protection, was authorized by the Flood Control Act of 1962 (PL 87-874) as the Mississippi River Delta at and below New Orleans, Louisiana and changed to New Orleans to Venice after authorization. The project is located along the east bank of the Mississippi River from Phoenix, Louisiana, (approximately 28 miles southeast of New Orleans) down to Bohemia, Louisiana, and along the west bank of the river from St. Jude, Louisiana, (approximately 39 miles southeast of New Orleans) down to the vicinity of Venice, Louisiana. It will provide protection from hurricane tidal overflow for 100-year frequency storms. The protected area encompasses approximately 75% of the population and 75% of the improved lands in the lower Mississippi River delta region. The project consists of the following: West Bank: St. Jude to City Price – 3 miles of enlarged back levees from St. Jude to City Price; Reach A – 13 miles of enlarged back levees from City Price to Tropical Bend and two 54" flap-gated culverts; Reach B1 – 12 miles of enlarged back levees from Tropical Bend to Fort Jackson and a floodgate at Empire; Reach B2 – 9 miles of enlarged back levees from Fort Jackson to Venice; West Bank River Levee (WBRL) – 34 miles of enlarged west bank Mississippi River levees from City Price to Venice; East Bank: Reach C – 16 miles of enlarged back levees from Phoenix to Bohemia and 10 flap-gated culverts. The project is now being constructed as a component of the Greater New Orleans Hurricane and Storm Damage Risk Reduction System.

The following is a list of FEMA Flood Insurance Studies (FIS), which also pertain to the St. Tammany Parish study area:

1) Town of Abita Springs, Louisiana, dated May 1988;
2) City of Covington, Louisiana, dated May 1980;
3) Town of Mandeville, Louisiana, dated October 1982;
4) Town of Madisonville, Louisiana, dated September 1982;
5) Town of Pearl River, Louisiana, dated May 1988;
6) City of Slidell, Louisiana, dated April 1999; and
7) St. Tammany Parish, Louisiana, dated April 1999.

## PROBLEM IDENTIFICATION

### INTRODUCTION

The city of Slidell, in St. Tammany Parish, Louisiana, has a long history of repetitive flood damage due to rainfall events, with an inadequate drainage outlet at the end of the W-14 Canal that is frequently affected by backwater from Lake Pontchartrain. Identifying the problems and needs of the W-14 Canal Basin as related to urban flood protection is required in order to define the Federal plan to provide additional urban flood protection to the W-14 Canal Basin area. To do this, it is necessary to understand the national objective of water and related land resources planning as well as the past, present, and projected future conditions. This section contains a summary of information related to social, economic, and environmental resources of the study area, and provides a basis for determining the potential economic, social, and environmental effects of urban rainfall flooding.

### EXISTING CONDITIONS

#### LOCATION

The proposed project improvements will provide additional urban flood protection for the City of Slidell located in St. Tammany Parish. St. Tammany Parish is bounded by Lake Pontchartrain to the south, the state of Mississippi to the east, Washington Parish to the north, and Tangipahoa Parish to the west. St. Tammany Parish is located in southeast Louisiana. It is included as a major urban center of the New Orleans Metropolitan Statistical Area. The study area encompasses the drainage basins of the Bayou Bonfouca/Bayou Vincent (W-13), the W-14 Diversion Canal, and the Doubloon/French Branches (W-15). Construction of the W-14 Canal in the 1940's intercepted the westward course of Bayou Pattasat, capturing the runoff of this stream that, prior to construction, was pumped into Bayou Bonfouca after traversing Old Slidell downtown area. Storm water runoff from the area northeast of the canal alignment continued to flow into the W-14 Canal via gravity

drainage. Development of this area increased runoff that exceeded the canal's design capacity. Larger storms caused stormwater to overflow the canal's west bank, spilling into Bayou Pattasat old causeway and overwhelming the capacity of the existing City Barn Pumping Station. The project area improvements are therefore circumscribed by the course of the W-14 Canal, south of Interstate Highway 12, and northwest of Interstate Highway 10. The W-14 canal is approximately 20,000 feet long within these limits. The W-14 Canal flows under six bridges at the following streets: North Boulevard, Robert Boulevard, Independence Drive, Florida Avenue, Cousin Street, and Daney Street. The W-14 Canal flows southeasterly along the Fritchie Marsh after passing under the I-10 bridge, joining Salt Bayou immediately upstream of this stream connection to Lake Pontchartrain. The W-14 drainage basin experiences significant rainfall flooding.

## PHYSICAL SETTING

Physiography. The Slidell area of St. Tammany Parish is of low relief, with elevations ranging from near sea level in the south to approximately 15 feet National Geodetic Vertical Datum (NGVD) in the north. The major physiographic features are swamp and marsh in the south, gently sloping uplands of Pleistocene Prairie terraces in the north, and steep stream banks with narrow flood plains. Swamps and marsh contain Holocene deposits of poorly drained soft to very soft clays, organic clays, silt, and organic debris. Pleistocene Prairie terrace deposits consist of moderately drained stiff to very stiff clays, silt, and sand with occasional gravel. Holocene alluvium is deposited in the narrow flood plains of streams and rivers and consists of reworked Pleistocene terrace deposits. The drainage in this area is primarily to the south end toward Lake Pontchartrain.

Geology. The surface as well as the subsurface consists almost entirely of Pleistocene deposits of the Prairie terrace. Measured from the northern terminus of the project, from approximate distance 9,500 ft to 10,500 ft recent alluvium is found, extending down to approximately -25 feet NGVD. 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 and from distance 10,500 to the end of the study area. These deposits exist at the surface down to approximately -18 feet NGVD and from approximately -25 feet to -45 feet NGVD. A layer of silty-sand with lenses of silt and sand lies between approximately -18 feet and -30 feet NGVD and extends from distance 0 to approximately 10,500 feet. A zone of silty-sand and sand with lenses of silt and lean clay is located at approximately -45 feet NGVD 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.

Sea Level Rise. USACE regulations (EC 1165-2-211) require that sea level change impact must be considered in evaluating projects throughout their project 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 1 below.

Table 1
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 period of analysis of the project.

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 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 sea level rise scenario, the banks of the W-14 canal between the project limits will 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 would have to comply with Federal regulations for flood plain development controlling the quantity and quality of their discharges into the W-14 Canal.

Subsidence. Relative subsidence is less than 0.5ft/50 year in the study area.

Soils. Within the vicinity of the W-14 Canal, most of the soil types are Myatt-Stough-Prentiss complex (USDA SCS 1990). These soils are described as loamy, level and very gently sloping, poorly drained to moderately well-drained soils. The Myatt series soils have a dark gray, fine sandy loam surface layer, which is approximately 4 inches thick. The subsurface layer contains a gray, mottled fine sandy loam, which extends to a depth of 12 inches. The subsoil is a gray, mottled loam and extends to a depth of 50 inches. The underlying material is a light brownish gray, mottled clay loam and extends to a depth of 64 inches. In addition, Myatt series soils are well suited for supporting wetland plant habitats.

The Stough series consists of coarse-loamy soils, which are moderately poorly drained and moderately slowly permeable. They are formed in loamy marine and fluvial sediments. Stough soils have moderate potential for supporting wetland plant habitats. The Prentiss series are coarse-loamy soils that are moderately well-drained and form in loamy marine and fluvial sediments. Prentiss soils are poorly suited for supporting wetland plant habitats.

Climatology/Hydrology.

a. Climate. The climate of the study area is humid subtropical, with short, generally mild winters and hot, humid summers. Precipitation in winter usually accompanies the passing of a cold front. Prevailing southerly winds create a strong maritime character. This movement from the Gulf of Mexico helps decrease the range between hot and cold temperatures and provides a source of abundant moisture and rainfall.

b. 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 Weather Station. This station is shown in Table 2 with the monthly and annual average normals, which are based on the period 1971-2000. The annual mean normal temperature is 67.5 $^{o}$F, with monthly mean temperature normal varying from 82.1 $^{o}$F in July to 50.7 $^{o}$F in January.

Table 2
Mean Monthly and Annual Temperature ($^{o}$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 |

c. 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 3 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.

Table 3
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 |

d. Wind. The average wind speed in the study area is 8.1 miles per hour (mph), based on the period 1974-2007 at New Orleans International Airport. The predominant wind 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 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.

e. Stream Gaging. Stream gaging data are available from twenty-nine gaging stations in the study area. All but two of these stations are maintained by the U.S. Geological Survey, which uses the North American Vertical Datum of 1988 (NAVD). The stations, with their maximum and minimum stages, are shown in Table 4. Discharge records are not available in the study area.

Table 4
Stream Gaging Data

| Slidell Area Partial-Record Gages | Period of Record | Max Stage (ft) | Date | Min Stage (ft) | 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 @ Brownswitch 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 | - |
| 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 NVGD
b. Corps gage
c. Continuous Record Gage
d. Caused by hurricane
e. Datum of gage assumed

N/A Not Available
UND Undetermined

Sources: US Geological Survey Water-Data Reports LA-02 to LA-07
US Geological Survey Baton Rouge Office
US Army Corps of Engineers, New Orleans District

f. 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. Some of the major floods caused by rainfall are 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-water mark of 7.1 feet NGVD 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 ft NGVD on the gage at Bayou Vincent. The gage on Bayou Liberty near Slidell exceeded the 6.0-ft limit of the gage. The Slidell WSFO gage recorded a storm total of 4.87 inches.

April 1983: During the 5-8 April period, 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 the Bayou Bonfouca at 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 on 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 ft NGVD 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, and no homes were reported damaged. The May storm occurred on the 29$^{th}$ and 30$^{th}$ and dropped 9.53 inches on Slidell Airport. The 22 October rainstorm was caused by a cold front which dumped 5 inches of rain at the WSMO 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 George in 1947, 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 Isidore and Hurricane Lili in 2002, Hurricane Katrina in August 2005, and Hurricanes Gustav and Ike in 2008. Highlights of some of the 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 on the W-14 Canal with the Daney Street gage measuring 4.20 ft. NGVD and the Robert Boulevard gage 8.83 ft. NGVD, both on 28 October.

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

Tropical Storm Allison (June 2001): Remnants of a very slow moving Allison caused heavy rainfall during 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 the 3-day period 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 also 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 over the 3-6 October period with 4.06 inches on the 4th, while the National Weather Service office (WSMO) received 4.95 inches with 3.88 inches also on the 4th.

Hurricane Katrina (August 2005): On August 29, Hurricane Katrina sent a massive surge from Lake Pontchartrain into Slidell, flooding and destroying most of the area. Most of the recording gages became inoperable, and the surge was estimated to be 16.0 ft. Portions of the I-10 bridge over Lake Pontchartrain were uplifted and knocked into the lake. Rain varied between 8 and 10 inches according to storm rainfall accumulations; most of these gages also were destroyed.

Hurricane Rita (September 2005): On September 23, Hurricane Rita struck Louisiana at Sabine Pass as a Category 3 storm with 120 mph winds. In the Slidell area, winds were approximately 65 mph with minimal rainfall. Lake surges in the vicinity of Slidell were 6.5 ft., which is sufficient to flood a large number of homes. Flood losses were minimal in the Slidell area because Hurricane Katrina flooded the city a few weeks earlier.

Hurricane Gustav (September 2008): Gustav made landfall near Cocodrie, Louisiana, on 1 September. The USGS gages Lake Pontchartrain at I-10 near Slidell and Little Irish Bayou at Hwy 11 near Slidell recorded gage 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 were 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 making land fall 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 include a gage height of 8.56 ft at the USGS Lake Pontchartrain at I-10 near Slidell gage on the 12th, and a gage height of 5.63 ft (5.58 ft NAVD) at the Little Irish Bayou at Hwy 11 near Slidell gage, also on the 12th.

g. Tides. Tides in Lake Pontchartrain have a tidal range of 0.6 feet. The mean high water is approximately 1.6 feet NGVD, and the mean low water is approximately 1.0 feet NGVD.

EXISTING PROTECTION AND DRAINAGE

Lands within the project area are at slightly higher elevations than most other areas within the New Orleans metropolitan area and are largely dependent upon gravity drainage; however, they are part of the Mississippi River Deltaic Plain and are immediately adjacent to large tracts of wetlands, heavily influenced by heavy rains, storms, and hurricanes that pass through the Gulf Coast. The Slidell area is subject to heavy rain storms, hurricanes, and spring floods that periodically threaten homes and businesses, requiring drainage protection to reduce potential damages.

The drainage system of the city of Slidell and vicinity is composed of a complex network of natural streams and interconnecting canals. These include: Schneider Canal, Bayou Bonfouca/Bayou Vincent (W-13), Main Diversion Canal (W-14), and Doubloon Branch-French Branch (W-15). The drainage basins for these channels are not well defined. The canal systems are partially separated by the embankments of Interstate 10 and the Southern Railway System. Crossflow between the channels can occur through underpasses, through several diversion channels, or overland. The diversion channels include the W-14 West Diversion Canal, connecting W-14 Canal to Bayou Vincent, and Reine Canal, connecting the W-14 Canal to the W-15 Canal.

The W-14 Canal is a major canal system draining the majority of the city of Slidell. The W-14 Canal drains an 8-square-mile area and is approximately 10 miles in length from the headwaters to the confluence with Salt Bayou near Lake Pontchartrain. The W-14 Canal extends from its source just north of Interstate 12 near Brownswitch Road south-southeasterly past Interstate 10 to its outfall in the Fritchie Marsh. The W-14 Canal Basin encompasses approximately 5,500 acres. The drainage basin has elevations varying from 2 feet to 25 feet NAVD.

The W-14 Canal drains most of the incorporated area of Slidell, as well as a small area north of the city limits. The canal was built in the 1940's by the Louisiana Office of Public Works (now part of the Louisiana Department of Transportation and Development). The lower portion of the W-14 Canal was enlarged to a 60-foot bottom width in the mid-1970's. The upper reach, where most of the local flooding occurs, has never been enlarged; however, residential and commercial development has increased exponentially since the canal was originally excavated. The W-14 Canal currently bears little resemblance to its original conditions.

## DEVELOPMENT AND ECONOMY

Businesses and Employment. The W-14 Canal Improvements project is part of the New Orleans Metropolitan Statistical Area (MSA). According to the "Slidell Tomorrow – The 20 Year Master Plan, Slidell Master Plan – Phase 2", prepared by Urban Systems Associates, Inc. and Villavosa and Associates in December 2008, the dominant employment sectors in Slidell are services and retail trade with health services and personal services as the most frequently occurring employment establishments. The unemployment rate in the City of Slidell for September 2011 was 8.9%.

Land Use. Most of the study area is urban in nature, comprising shopping centers, small commercial establishments, and numerous residential subdivisions. The study area has several small industries. Increased urbanization of the W-14 Canal Basin has caused higher volumes of runoff based upon the increase of impervious areas and the decrease in the time of concentrations. This increase of storm water runoff has caused extensive street flooding and some property damage as the storm waters exceed the canal banks. Flooding in the area of the W-14 Canal is due not only to the inadequate capacity of the channel itself, but also to backwater flooding from high water levels in Lake Pontchartrain typically experienced during Hurricane events. Pumping capacity to address the adverse impact from high lake levels will be assessed in the SELA Schneider Canal Hurricane Risk Reduction Study authorized for this area.

Population and Income. The City of Slidell is the largest municipality in St. Tammany Parish. The latest population data, displayed in Table 5 , 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.

Table 5
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*

The median household income (Table 6) increased from $42,900 in 1999 to $50,675 according to the 2005-2009 American survey.

Table 6
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*

Additionally, the City of Slidell labor force (Table 7) rose slightly to 12,500 (2005-2009 American Survey) from 12,000 in 2000.

Table 7
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 |

Economic Outlook. The development of The Summit Fremaux mixed-use Life Center could provide an economic impact to the City of Slidell. The project is situated on a 400-acre site in the southwest quadrant of the new I-10 interchange at Fremaux Avenue. Land uses planned for this regional development include retail, office, residential and medical facilities. Phase 1 of *The Summit* development is comprised of 700,000 square feet of lifestyle retail including two department stores, restaurants, a cinema, and a bookstore. In addition, the University of New Orleans has committed to build a research and technology campus at part of the master plan.

## ENVIRONMENTAL AND NATURAL RESOURCES

The W-14 Canal Basin in St. Tammany Parish has few undeveloped land areas. Most green spaces are incorporated in residential yards and public parkways. Canal rights-of-way have been severely altered by urbanization, leaving minimal habitat for wildlife.

Air Quality. The study area largely consists of residential and commercial neighborhoods. Direct emissions are primarily due to the industrialized developed areas surrounding Slidell.

Water Quality. Present water quality problems in the W-14 canal are most likely due to runoff of urban waste such as oil, grease, and trash, or occasional sanitary wastewater contamination of the drainage system. During periods of flooding, raw or partially treated wastewater may combine with stormwater runoff as the result of bypasses and overflows and infiltration and inflow from the sanitary wastewater conveyance system into the storm water conveyance system, causing significant contamination. Stormwater runoff also contributes urban pollution to the canal system. Water quality data for this project is provided in Volume 2, Appendix C – Engineering Investigations (“Water Quality”).

Humans could be exposed to pathogenic bacteria in the water of the W-14 Canal during major flooding or storm events. Organisms that are discharged from the intestinal tracts of humans or animals in fecal material may be harmful to humans. The most commonly employed pathogenic indicators are in the coliform group of bacteria.

Biological Oxygen Demand (BOD) is an indicator of biodegradable organic material related to wastewater as well as synthesized organic materials. Biodegradable materials deplete oxygen in the water column as they decay. This can be detrimental to aquatic species and can cause undesirable anaerobic conditions. No known testing has been performed to analyze BOD in the W-14 Canal.

Aquatic Resources. The W-14 Canal does not support important aquatic resources due to artificial drainage, dense vegetation, poor water quality, and inadequate water depths. Runoff

from nearby developed areas has reduced the canal's aquatic habitat value by introducing various urban pollutants (e.g., oil, grease, fertilizers, pesticides, etc). However, some freshwater fish species such as bowfin, spotted gar, and mosquito fish may be found in the canal. Invertebrates, such as crawfish and grass shrimp, may inhabit portions of the canal. Aquatic species that survive are those able to tolerate low dissolved oxygen levels and various contaminant levels.

Wetlands. The vegetation within the general project area is classified as moderate to low quality mixed pine/bottomland hardwoods, with some saturated areas that support wetland plants. Wetland vegetation can be found within the proposed Robert Boulevard Detention Pond enlargement area. Approximately 1.1 acres of mixed pine/bottomland hardwood wetlands within this pond would be removed by the proposed action. The Robert Boulevard Detention Pond is mainly in a "dry condition" except for when a rainfall of 2" to 3" occurs. The pond drains immediately after the rainfall event as the W-14 canal levels decline. The generally dry condition of the pond and regular mowing eliminate the opportunity for other wetland vegetation species to propagate. The vegetation found on the upper reaches of the W-14 Canal banks is of less ecological value since these areas have undergone severe alteration by residential and commercial development and are regularly maintained by mowing.

Mixed Pine/Bottomland Hardwood Forest. Historically, the non-aquatic habitat within the project footprint would be classified as pine savannah. Approximately 80 percent of the vegetation found within the project area is slash pine. The remaining 20 percent is comprised of species such as loblolly pine, several species of oak, southern magnolia, sweetbay magnolia, Drummond red maple, sweet gum, black gum, American sycamore, Chinese tallow, and persimmon. The average diameter at breast height of these species ranges from 6 to 16 inches. Understory species found within the area include poison ivy, fern, muscadine, wax myrtle, Chinese privet, pepper vine, honey suckle, yaupon, smilax, and elderberry.

Wildlife. Avian species likely to occur in the W-14 Canal area for occasional feeding and/or loafing include wood ducks, great egrets, snowy egrets, and green herons. 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 king snake, broad-banded water snake, and western cottonmouth. Mammals likely to occur in these areas are the Virginia opossum, northern raccoon, and nine-banded armadillo.

To quantify anticipated project impacts to fish and wildlife resources, the Modified Charleston Method (MCM) was recommended by USFWS rather than the standard Wetlands Value Assessment methodology because the project's adverse effects will be primarily to the pine-savannah habitat type rather than to wetlands habitats. Target years selected for this analysis were 0 (baseline), 1, 10, 25, and 50 for both future with project and future without project scenarios.

Baseline values for model variables were obtained from site visits, communications with CEMVN staff, and review of aerial photography.

Threatened or Endangered Species. Species listed as threatened or endangered in the area include the Louisiana quillwort, brown pelican, Gulf sturgeon, gopher tortoise, red-cockaded woodpecker, and ringed sawback turtle. Although these species of Federally-listed plants and animals occur within St. Tammany Parish, evaluations show that the proposed project area may provide suitable habitat for only the gopher tortoise and red-cockaded woodpecker. However, the CEMVN determined on the basis of its fieldwork, that the proposed action would be unlikely to affect gopher tortoises or red-cockaded woodpeckers, or their habitat. Two biologists from the USFWS also inspected the proposed project area and gathered field data on 15 October 2008. On 31 October 2008, the USFWS sent a letter indicating its concurrence with the CEMVN's determination that the project, as then proposed, would be unlikely to affect gopher tortoises or red-cockaded woodpeckers or their respective habitats.

For the present smaller-scale project, CEMVN has similarly concluded that the proposed action is not likely to adversely affect any Federally-listed threatened or endangered species or their critical habitat. The U.S. Fish and Wildlife Service concurred with this determination via letter received by CEMVN on October 12, 2011.

Similarly, the CEMVN determined that no threatened or endangered aquatic marine species are likely to occur within the project area. No species under the purview of National Oceanic and Atmospheric Administration (NOAA) Fisheries would be likely to be found in the proximity of the project action; therefore, the proposed action would have no effect on any NMFS-managed endangered species.

Cultural Resources. A cultural resources investigation of the original W-14 project area, as then defined, was conducted in 2008 by R. Christopher Goodwin and Associates, Inc. (Moreno, et al. 2008). This study states that the prehistoric and historic residents of St. Tammany Parish and the project vicinity would have exploited the natural resources from both the longleaf pine and marsh environments of this area. A determination of no impacts to cultural resources was submitted to the Louisiana State Historic Preservation Officer on 9 September 2008. A letter of concurrence was received on 7 October 2008.

The revised W-14 Canal project area includes a small area not previously investigated by Moreno et al. (2008). The area was visited and examined by MVN archaeologist, Dr. Paul Hughbanks, in 2011, who located no prehistoric or cultural resources or potential for hidden cultural resources. A determination of no impacts to cultural resources was submitted to the Louisiana State Historic Preservation Officer on September 22, 2011. A letter of concurrence

was received on November 16, 2011.

Recreational Resources.

Canals

*Interstate 12 to Fremaux Avenue*

The Pinewood Country Club is located adjacent to the project area. The member owned semi-private club provides an 18-hole golf course, practice facility, two lighted tennis courts, and a competition size swimming pool with a separate wading pool. The clubhouse includes a cocktail lounge and restaurant, meeting and card rooms, full service golf shop, and a Grand Ballroom available for rental. Special activities at the country club include Oktoberfest dinners, poolside luaus, and holiday buffets and events.

The Pinewood Porpoise Swim Team utilizes the pool and consists of over 100 swimmers who compete in the St. Tammany Parish Swim League. Swim lessons are also available at the pool.

The canal at this location is narrow and unsuitable for boating, and the water quality is not conducive to fishing and swimming.

*Fremaux Avenue to Daney Street*

There is no developed recreation within the project area. The canal in this location is also narrow, and unsuitable for boating, fishing, and swimming.

*Daney Street to Interstate 10*

The Slidell Bantam Baseball Association (SBBA) Complex is adjacent to the project area. The complex includes twelve baseball/softball fields, three football fields, soccer fields, and a gym with basketball and volleyball courts. There are more than 40 baseball/softball leagues that use the fields.

The canal at this location is approximately 40 feet wide; however, it is still unsuitable for boating, fishing, and swimming.

Detention Ponds

The West Diversion Detention Pond located on property owned by the city of Slidell on the west side of U.S. Highway 11 near North Boulevard consists of 13.8 acres. A second existing detention pond also located on property owned by the city of Slidell at Robert Boulevard will be enlarged from its current 19.6 acres to 31.17 acres. The ponds are usually dry for most of the year; however, they start to fill when rainfall exceeds 2 inches. Due to the lack of consistent water levels, the ponds are not conducive to recreational activities such as boating and fishing.

*West Diversion Detention Pond*

There is no developed recreation within the project area.

*Robert Boulevard Detention Pond and Weir*

There is no developed recreation within the project area.

Bridge Relocation

*Florida Avenue Bridge*

There is no developed recreation within the project area.

Aesthetic (Visual) Resources.

Existing Structures: Structures are too numerous to name and cover the entire project area from north to south, Interstate 12 to Interstate 10. The dense, urban area features homes constructed of wood, brick and a variety of other veneers. Ages of homes in the project area range from 19th century to modern day. Commercial areas feature buildings that range from one story to taller than thirty-five (35) feet. These structures are often constructed with such materials as aluminum, steel, tempered and mirrored glass, concrete, and brick and mortar. Industrial structures are few and far between. The most notable industrial structure would be the sewer treatment plant, located to the south of and adjacent to the project area.

Natural structures, such as levees, reservoirs, canals, and those associated with parks and recreation facilities are also numerous. On the northern side of the project area resides Pinewood Country Club. The country club features an eighteen (18) hole championship golf course complete with water hazards, sand bunkers and a variety of man-made terrains. On the south side of the project site, is the Slidell Baseball Association Complex. This recreation and athletic complex

features several baseball fields, soccer/ football fields, concessions, lighting systems, internal circulation routes and parking.

Water: The Louisiana Scenic Rivers Act of 1988 was established to preserve, protect, and enhance the wilderness qualities, scenic beauties, and ecological regimes of rivers and streams in the state. Scenic Rivers in the vicinity of the project area includes Cane Bayou and Bayou LaCombe, to the west, and West Pearl River and Morgan River, to the east. None of these Scenic Rivers is in or near the immediate project area, and will not be impacted by any proposed work.

Other water resources are abundant throughout the Slidell area. The W-14 Canal and its associated (existing) detention ponds are the most obvious water resources in or near the project area. Other resources include a variety of ponds and lakes, Bayou Bonfouca, Liberty Bayou, the marina community at North Shore and Lake Pontchartrain.

Land Use: The dominant Eco-Region (according to the State of Louisiana Eco-Region Map) is Gulf Coast Flatwoods (Daigle, *et al*., 2006). Other, nearby Eco-Regions include Coastal Marshes, Gulf Barrier Islands and Marshes, Floodplains and Low Terraces, and Lake Pontchartrain.

The project area is characteristic of the Gulf Coast Flatwoods, with nearly level terraces, poor to moderately well drained soils that typically have a silty and fine sandy loam texture. Historically, longleaf pine dominated the broad flats and low ridges, forming more densely-stocked flatwoods and open savannas. A high natural fire frequency was typical, often sparked by lightning and fueled by grasses, and maintained the open pine flatwoods and savannas. While most of the longleaf pine savannas have been lost, remnant savannas are centers of biodiversity supporting a variety of grasses, sedges, rushes, and an array of wildflowers: red lilies, orange milkweeds, yellow pitcher plants, white, orange, and pink orchids, lavender butterworts, and purple sundews. Much of the landscape is now in mixed forest or pine plantations, while some better-drained land has been cleared for pasture or crops (Griffith and Omernik, 2008).

As with most cities, land use varies greatly in the Slidell area. Key uses most associated with those lands adjacent to the W-14 Canal include Parks and Open Space, Public/ Quasi-Public, Single-Family Residential, General Commercial, and Heavy Industrial.

In January 2008, the City of Slidell commissioned the Tulane Regional Urban Design Center (TRUDC) to create a set of Design Guidelines that would govern Slidell's Olde Towne Preservation District and the Fremaux Avenue Corridor. This request was made in an effort to reinforce the important efforts of the Olde Towne District Advisory Commission, and to address the expected development pressures brought by the connection of Fremaux Avenue and Interstate 10. The City of Slidell identified a need to promote quality design practices within the Olde Towne Preservation District, in order to maintain and improve the urban environment and

economic viability of this area, while simultaneously focusing on the Fremaux Avenue Corridor in order to help control the appearance and quality of construction along this commercial corridor as development pressure continues to rise. The City of Slidell and its citizens seek to recognize, preserve, and protect the cultural and historic architecture and urban design within Olde Towne and along the Fremaux Avenue Corridor.

Landform and Vegetation: The fringe habitat immediately adjacent to the W-14 channel banks is composed primarily of urban forests composed of hardwoods, various pine species and invasive species. View sheds from crossing thoroughfares are typically high in scenic quality, due to the W-14 Canal's appearance as more of a natural, rather than man-made, feature.

While litter does seem to be a problem along some of the banks of the W-14 Canal, over all, the landscape of the project areas is scenic and contains those visual qualities and characteristics that make it memorable and/or unique compared to other water bodies in the surrounding area. There are no known specifically identified protected trees or other plant materials in the immediate project area.

Overall, the terrain of the project area is relatively flat with the occasional, small ridge.

Access: Visual public access to the project site(s) is abundant. Several major thoroughfares, including Gause Boulevard, Fremaux Avenue, Florida Avenue, Daney Street, Independence Drive and North Boulevard all intersect and cross the W-14 Canal. Louisiana Highway 11 runs parallel to W-14 Canal for a short distance. In most cases, these thoroughfares provide pedestrian systems that also provide public visual access to the project site(s). There are no known national or state designated scenic byways in or near the project area.

Hazardous, Toxic, and Radioactive Waste.

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 as part of "Southeast Louisiana (SELA) Flood Control, Stormwater Drainage Canal, and Retention Ponds in Slidell, Louisiana." CEMVN contractors, Strategic Planning Associates and Materials Management, collected a total of twenty samples at six sites of interest. Total Petroleum Hydrocarbon-Diesel (TPH-D) was present at concentrations exceeding the Louisiana Department of Environmental Quality's Risk Evaluation/Corrective Action Program (RECAP) standards at two sample locations in the drainage canal south of Shortcut Highway. Total Petroleum Hydrocarbon-Oil (TPH-O) was present at elevated concentrations at one sample point in the canal south of Shortcut Highway. Urban drainage canals are all likely to show some contamination, due to runoff from roads. Petroleum

hydrocarbons are likely to be found. Any dredged material will be considered likely to be contaminated and will be placed into an appropriate landfill.

Methylene chloride exceeded the standard at one sample point; methylene chloride is a very common laboratory contaminant. Lack of other contaminants associated with the use of methylene chloride (metal cleansing or paint removal contaminants) indicates that it is most likely an artifact of laboratory contamination. In addition, a split sample showed no methylene chloride. Therefore, the methylene chloride concentration at one sample point does not require further consideration.

USACE-MVN personnel made a field inspection of the W-14 Canal on 12 September 2011. No signs of HTRW were found. Other than the probable contamination of canal sediments, no Recognized Environmental Conditions (RECs) were identified. The probability is low of encountering HTRW during the course of the canal improvement work, except in dredged sediments, which will be appropriately disposed. No further investigation of HTRW related to the proposed project is recommended, and the project may proceed as scheduled.

SOCIOECONOMIC RESOURCES

Population and Housing. The project area is surrounded by wooded areas as well as neighborhoods of single-family and multi-family residential structures and commercial buildings. Under the recommended plan, three reaches of the W-14 Canal would be subject to clearing and snagging and partial reconstruction. For the reach of the W-14 Canal running from Daney Street to Interstate 10, already-completed channel improvements constructed by St. Tammany Parish in 2010 are incorporated into the proposed project. For the portion of the W-14 Canal between Interstate Highway12 and Fremaux Avenue, the channel runs through a developed area with some residential properties abutting the canal. For the W-14 Canal between Fremaux Avenue to Interstate Highway 10, the channel traverses a primarily wooded area.

The proposed work also includes the West Diversion Detention Pond on the west side of U.S. Highway 11 near North Boulevard. The detention pond is located in Census Tract 411.03, Block Group 1, Block 1055, which according to 2010 U.S. Census data, had no residents or housing units within its boundaries. The West Diversion Detention Pond was constructed during the 1997 – 1998 timeframe by the City of Slidell. The proposed project also includes expanding the Robert Boulevard Detention Pond by approximately 11.57 acres (from 19.6 to 31.17) and construction of a weir just north of Robert Boulevard. This area is located in Census Tract 410.04, Block Group 1, Block 1027 and has housing units along its northern border. Additionally, one residential property with a barn is located to the west of the Robert Boulevard Detention Pond within the proposed expansion area. This property qualifies for relocation assistance advisory

services and reimbursement of moving expenses for personal property. The project Real Estate Plan (REP) presently anticipates no additional costs under the Uniform Relocation Act.

Employment, Businesses, and Industrial Activity. The proposed project encompasses a roughly four mile stretch of the W-14 Canal in Slidell, LA between Interstate Highway 12 and Interstate Highway 10. The northern portion runs through a developed area which contains mixed retail and light industry. The southern portion is sparsely developed with little to no businesses or industrial activity near the proposed project, with the exception of a water sewer treatment plant.

Public Facilities and Services. South of Robert Blvd. and north of Highway 190, the W-14 Canal passes between St. Margaret Mary School and Bonne Ecole Elementary School. Seven other schools not directly adjacent to the construction sites are nearby. The St. Tammany Community Health Center, SMH Center for Family Health, and the Slidell Memorial Hospital are located near the existing Florida Avenue Bridge,

Transportation. Transportation infrastructure within the vicinity of the project includes Interstate Highway 12, Gause Boulevard, U.S. Highway 190, Interstate Highway 10, U.S. Highway 11, and municipal thoroughfares. Railroad lines parallel U.S. Highway 11, and a municipal airport is located just north of Interstate Highway 12 in the vicinity of the study area. The project area has waterborne access via Lake Pontchartrain.

Community and Regional Growth. Community and regional growth is influenced by national trends as well as local demographic attributes. In Louisiana growth trends are also closely related to reliable flood protection. The proposed project would reduce the risk of flood in the city of Slidell, LA. Between 2000 and 2010, the population of Slidell, LA increased from 25,695 to 27,068 according to U.S. Census data. Per capita personal income increased from $19,947 to $22,820 and employment increased from 11,329 to 11,906 between 2000 and the 2005-2009 period, according to the latest income and employment data available from the U.S. Census Bureau.

Tax Revenues and Property Values. The proposed project is located in Slidell, LA. According to the latest data available from the U.S. Census Bureau, the average median value for specified owner-occupied housing units in Slidell, LA in the 2005-2009 period was $162,800.

Environmental Justice. Analysis of 2010 U.S. Census data shows that the City of Slidell exceeds neither the 50 percent minority threshold nor the 20 percent low-income threshold established in Executive Order 12898, and therefore does not qualify as an Environmental Justice study area.

## CONDITIONS IF NO FEDERAL ACTION IS TAKEN

SOCIOECONOMIC RESOURCES

Population and Housing.

*Direct, Indirect, Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to population and housing due to project construction under this alternative. However, a heightened risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would continue to require routine maintenance operations.

Employment, Businesses, and Industrial Activity.

*Direct, Indirect, and Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to employment, businesses, and industrial activity under this alternative. However, the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Public Facilities and Services.

*Direct, Indirect, Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to public facilities and services under this alternative. However, the risk of flooding to public facilities within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Transportation.

*Direct, Indirect, Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to transportation under this alternative. However, the risk of flooding within the W-14 Canal drainage basin would persist, and there are substantial traffic effects prior to, during, and after large-scale flooding events in this area with the current level of risk reduction.

Community and Regional Growth.

*Direct, Indirect, Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to community and regional growth under this alternative. However, a heightened risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Tax Revenues and Property Values.

*Direct, Indirect, Cumulative Impacts.* There would be no direct, indirect, or cumulative impacts to tax revenues and property values under this alternative. However, the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

ENVIRONMENTAL RESOURCES

Air Quality. If the proposed action is not undertaken, potential air quality impacts associated with the construction and operation of new storm damage reduction measures would not occur. Periodic flooding can lead to temporary deterioration in air quality when contaminants in flood waters volatize. In addition, sediment clean up can lead to temporary increases in fugitive dust from street sweeping, including dried sewage. Also, transportation of debris and rubble from clean up of storm damages contributes to local emissions and decrease air quality.

Water Quality. If the proposed project is not constructed, routine maintenance of the existing canal could release undesirable materials such as grass clippings and brush and tree trimmings into the surface water. The effects of these releases would be temporary and localized in the immediate work area.

Aquatic Resources. If the proposed action is not undertaken, aquatic resources within the W-14 Canal would remain in their present state. Due to the high ephemeral flows and continuous introduction of urban runoff, the value of these aquatic resources would remain low. Inflows of oil and grease, fertilizers, pesticides, and other urban waste materials will continue to contaminate the W-14 Canal aquatic environment, as well as periodic urban runoff from storm sewers and septic tanks.

Wetlands. If the proposed action is not undertaken, the functions and values of existing wetlands within the project area would continue to be influenced by periodic flooding and rainfall events. Routine maintenance of the existing W-14 Canal would have no effect on wetlands because these actions take place within previously disturbed areas. Thus the “no action” alternative would cause no direct wetland impacts.

Mixed Pine/Bottomland Hardwood Forest. If the proposed action is not undertaken, routine maintenance of the W-14 Canal is expected to continue. As the maintenance activities occur within mowed rights-of-ways and do not extend into the surrounding forests, these actions would have no effect on mixed pine/bottomland hardwoods.

Wildlife. With the no action alternative, habitat values and biological diversity in this ecological community would continue to be adversely impacted by increased residential and

commercial development. Routine maintenance of the existing canal would continue, causing temporary adverse impacts to wildlife and their habitats. The presence and noise of heavy equipment used to maintain the W-14 channel would cause wildlife to disburse, but animals would be expected to return upon completion of maintenance operations.

Threatened or Endangered Species. If the proposed action is not undertaken, any threatened or endangered species that might stray into the project area would be subject to existing habitat conditions, which include considerable urban encroachment and the presence of various pollutants in the W-14 Canal waters and outfalls.

Cultural Resources. With the no action alternative, cultural resources would not be affected. The current state of any known or unknown resources in the project vicinity would be unaffected. However, if lack of modification to the W-14 Canal allows increased flooding in the City of Slidell, cultural resources could be adversely affected by these flood situations.

Recreational Resources. Without implementation of the proposed action, the recreational environment would remain unchanged and would be dictated by the natural land use patterns and processes that have dominated the area in the past. Recreation facilities would remain vulnerable to floods.

Aesthetic (Visual) Resources. With the no action alternative, the proposed action would not be constructed by the CEMVN and the aesthetic resources of the project area would remain as presently composed. However, the existing W-14 Canal would continue to require routine maintenance operations. Visual resources would evolve in a natural process and experience change as a consequence of the W-14 Canal maintenance practices.

Hazardous, Toxic, and Radioactive Waste. With no action, there would be little probability of increased HTRW exposure, because any contaminated sediments would remain in the canal bottom.

## PLAN FORMULATION

### PROBLEMS, NEEDS, AND OPPORTUNITIES

The primary problems, needs, and opportunities identified in this study relate to the need for improving urban flood protection in the W-14 Canal basin.

PROBLEMS AND NEEDS RELATED TO FLOOD CONTROL

Rapid suburban and commercial development in the W-14 Canal basin over the years has caused increased volumes of runoff and shorter times to peak runoff during storm events. In addition, the canal is typically very narrow for most of its winding reach through these heavily populated areas. Higher demands are placed on the W-14 Canal. Its capacity is often exceeded during heavy rains, causing significant street flooding and property damage. In addition, it may be expected that the fast-flowing water being pushed through the canal is eroding away the natural earthen canal banks. The existing canal is close enough to residential backyards to pose a threat to private property and safety.

Many major rainfall events since 1958 have caused substantial rainfall flooding throughout the area. (Refer to the Floods and Storms of Record Section of this report.) On average, the city of Slidell and vicinity receives 61.42 inches of precipitation each year. Storms can cover the entire area or be localized in nature. The following FEMA information for St. Tammany Parish was obtained from http://lamappingproject.com/parish-sttammany.html.

Table 8
FEMA Flood Insurance Policy Data

| Parish | Number of Policies | Premium Value ($1,000) | Coverage ($1,000) |
|---|---|---|---|
| St. Tammany | 48,746 | 23,000 | 11,400,000 |

The May 1995 flood event demonstrated a recognizable potential for the occurrence of flooding events that would easily exceed any protection afforded by existing drainage within the study area. The May 1995 flood resulted from torrential rains that accompanied 50 mph winds and tornadoes. Two to three inches of rain per hour fell for several hours during the peak storm period. Estimated flood damages for the May 1995 flood event total about $1 billion for Jefferson, Orleans, and St. Tammany Parishes. Local interests have made improvements, but have been unable to keep pace with the increasing impacts of rainfall flooding. Based on the repetitive flood

damages experienced, local officials requested that the Federal government participate in projects that would alleviate rainfall flooding.

A need exists to reduce urban flood problems in the W-14 Canal Basin. Improvements to the W-14 Canal system would reduce the financial risk sustained by homeowners, businesses, and local agencies. The need for improved drainage could be addressed by ensuring adequate pumping capacity and canal dimensions.

IMPROVEMENTS DESIRED

The desire for improvements in the W-14 Canal basin stems from the increasing severity of rainfall flooding in St. Tammany Parish, resulting in a greater level of urban runoff than the canals can carry.

St. Tammany Parish has been declared a Federal disaster area on several occasions due to excessive rainfall flooding. The disastrous flood event in May 1995 prompted a Congressional Directive for Southeast Louisiana (SELA) to expedite construction of economically justified Federal projects in the areas identified in four previous Mississippi Valley, New Orleans District (MVN) reports which are listed in the SELA Authorization.

The economic analysis completed for the W-14 Canal Improvements project provided as Volume 2, Appendix A of this Report, shows that approximately $17.8 million is lost in average annual damages due to rainfall events in the W-14 Canal basin. There is a need present to reduce the flood damages by providing adequate drainage improvements for the W-14 Canal basin.

**PLANNING CONSTRAINTS**

Legislative and executive authorities have specified the range of impacts to be assessed, and have set forth the planning constraints and criteria that must be applied when evaluating plans. Plans must be developed with due regard to the benefits and costs, both tangible and intangible, as well as associated effects on the ecological, social, and economic well-being of the region. Federal participation in developments should also ensure that any plan is complete in itself, efficient and safe, economically feasible in terms of current prices, environmentally acceptable, and consistent and acceptable in accordance with local, regional, and state plans and policies. As far as practical, plans should be formulated to maximize the beneficial effects and minimize the adverse impacts of the considered improvements, with due consideration to present and future conditions.

Section 108 of the Fiscal Year 1996 Appropriations Act and Section 533 of the WRDA of 1996 authorizes for construction all economically and environmentally acceptable projects identified in a number of reports, including the St. Tammany Parish, Louisiana, Reconnaissance

Report, dated July 1996. Improvements to the W-14 Canal were recommended in the July 1996 report and so were authorized by Section 533. This report is submitted to comply with the terms of Section 533 of WRDA 1996 which requires an analysis showing that the SELA project in question is "technically sound, environmentally acceptable, and economic, as appropriate."

Some features of the Recommended Plan will not meet the discharge flow requirements of ER 1105-2-100 (22 April 2000). ER 1165-2-21 (30 October 1980), *Flood Damage Reduction Measures in Urban Areas*, generally excludes improvements to drainage streams with flows less than 800 cubic feet per second (cfs) as not a Federal interest. However, rainfall (storm) drainage is defined as a project purpose under Section 533(d) of WRDA 1996, as amended. Several of the plans previously authorized by Congress under SELA and already approved for construction by HQUSACE, include improvements with systems less than 800 cfs. Congress, in using the specific language authorizing these projects has determined that there is a Federal interest notwithstanding the policy contained within the above-cited USACE regulations. The Recommended Plan falls within the SELA project purpose and authorization, as shown in the "Study Purpose and Scope" section of this report. Applying the 800-cfs criterion for cost-sharing purposes is not appropriate for the SELA project.

In formulating the W-14 Canal project, the project delivery team attempted to minimize the need for the acquisition of new rights-of-way. The W-14 Canal flows through a densely developed urban area, and the high cost of real estate would negatively affect the project's net benefits. To the extent possible, improvements were sited within existing rights-of-way.

**PLANNING OBJECTIVES**

Planning objectives stem from national, state, and local water and related land resources management needs specific to the project area. These objectives were developed through problem analysis and intense coordination with the Non-Federal Sponsor, CPRA as well as the city of Slidell and St. Tammany Parish. The following planning objectives were established to be responsive to the identified problems, needs, and opportunities:

1. Reduce or eliminate flooding within the project area for a minimum 10-year equivalent storm event, which means the flood protection has a 10 percent chance of being equaled or exceeded in any given year, and reduce flooding for less frequent storms within the W-14 Canal basin flood damages due to rainfall runoff in the W-14 Canal drainage basin;

2. Contribute to the Nation's economic development by reducing flood damages.

3. Minimize temporary adverse impacts on the natural environment and to social well-being that would be caused by construction of the proposed plan for the W-14 Canal basin;

4. Minimize to the extent possible the destruction of archaeological and historical resources that would be caused by construction of the proposed plan for the W-14 Canal basin;

5. Mitigate for all unavoidable impacts to significant cultural and fish and wildlife resources that would be caused by construction of the proposed plan for the W-14 Canal basin.

**FORMULATION PRINCIPLES**

The Guidance for Conducting Civil Works Planning Studies (ER 1105-2-100) requires systematic plan development that contributes to the Federal objective. Alternatives should be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability.

- Completeness is the extent to which a given plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective.

- Effectiveness is the extent to which a plan alleviates the specified problems and achieves the specified opportunities.

- Efficiency is the extent to which a plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

- Acceptability is the workability and viability of the plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

In general, when formulating plans, an effort is made to include only increments that increase the net benefits on a first- and last-added basis.

**MANAGEMENT MEASURES**

Structural management measures considered for providing flood protection for the W-14 Canal Improvements were limited to canal and detention pond improvements and bridge

replacement. St. Tammany Parish is hydraulically divided into subbasins by man-made and natural barriers.

In accordance with EP 1165-2-1, section 13-7 “Nonstructural Measures”, and Section 73 of WRDA 1974 (Public Law 93-251), consideration was given to non-structural alternatives. A non-structural analysis for the W-14 Canal was completed as an option to structural measures, with structure raising as the non-structural option. Upon completion of the overall SELA construction project, a floodplain study will be completed by the non-Federal Sponsor for the entire project area to assess any changes in flood hazards in the area and update the effective National Flood Insurance Program map for St. Tammany Parish if required.

**PLAN FORMULATION RATIONALE**

The Southeast Louisiana 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). The purpose of the SELA Project is to reduce flooding damages in Jefferson, Orleans, and St. Tammany Parishes. The authorization covered construction of all economically justified projects described in several previously completed New Orleans District (MVN) reports, one of which is the St. Tammany Parish, Louisiana, Reconnaissance Report of July 1996. The Report had developed a number of flood reduction plans (including the W-14 Canal project in Slidell) that were determined to be economically justified. Section 533 authorized these projects for construction without preparation of a feasibility report. The plan proposed for the W-14 Canal served as the basis for this analysis. A mathematical model of the drainage system was used to verify the results of the reconnaissance report and to determine where variations were necessary to ensure proper performance of the project.

Through the Section 108 and Section 533 authorizations, Congress directed the USACE to improve stormwater drainage systems in Southeast Louisiana. The plan studied and described in this Section 533(d) report was designed under the guidance of these authorizations to maximize flood control within the available rights-of-way for a 10-year level of flood risk reduction To provide flood protection at less than a 10-year level would minimize cost only a little, but would greatly reduce the benefits accrued.

A subbasin wide approach was used to develop a plan to reduce flooding in the area. Stage-frequency curves, feasibility-scope engineering designs and associated cost estimates were prepared.

The structural features of the project were designed to fit within existing rights-of-way in the urban areas of Slidell and St. Tammany Parish. Undeveloped lands were the only areas considered for additional rights-of-way. The majority of the study area is highly developed with residential and

commercial properties aligning the canal. Acquiring additional real estate has significant cost and is a time consuming process. Designs that maximize channel size, while minimizing right-of-way requirements optimize the cost-effectiveness of the plan. A project footprint that would significantly exceed the limits of existing rights-of-way would result in a project with a benefit-cost ratio less than unity.

The economic feasibility of a nonstructural option within a risk-based framework was analyzed. 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. The benefits associated with this option are a reduction in damages that would occur from the rainfall associated with various storm events. 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 were not included in this analysis. The benefits of the structure-raising option were considered only to the extent of the anticipated reduction in damages to residential structures and their contents, not nonresidential structures or automobiles.

## PLAN ASSESSMENT AND EVALUATION

### ECONOMIC CONSIDERATIONS

Most of the benefits that accrue from a flood risk reduction project arise from the reduction of physical flood damages. Physical inundation damages include structural damages to buildings and losses to contents; damages to roads, bridges, and other public utilities; and losses to personal property such as automobiles. In determining potential flood damages for this study area, flood damages were evaluated for urban structures, their contents and automobiles. In the initiation of urban flood damage analyses, field investigations were conducted and data was 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 depth-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. 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. 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.

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.

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 (CSVR) is expressed as a ratio of two values: the depreciated replacement cost of contents and the depreciated replacement cost of the structure. A panel of experts was convened to develop site-specific depth-damage relationships and CSVRS for feasibility studies associated with Jefferson and Orleans Parishes. 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.*

Vehicle depth-damage was based on interviews with car dealerships and insurance adjusters 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. 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.

An analysis of a nonstructural alternative to the proposed plan was performed for the W-14 Canal Improvements project. 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. Inputs for the model included depth-damage relationships, state-frequency relationships, structure valuations, contents-to-structure value ratios, and first floor elevations. 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 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 in the Economic Appendix (Volume 2, Appendix A) displays the costs for each of the five residential categories analyzed. Costs to elevate a structure were added to a per structure temporary relocation cost to complete the total cost of the structure raising measure.

Economic analyses were conducted for both structural and non-structural options. Plan design for the structural option was analyzed for a range of 8 frequency storms representing the entire range of frequency events between the 1- and 500-year storm events for each storage area. (See Plate 4 for Damage Reaches/Storage Areas Map). The plan was evaluated by comparing estimated equivalent annual benefits that would accrue to the study area over the 50 year period of analysis with estimated average annual costs. Average annual costs were determined using a Federal discount rate of 4 percent, at 2011 price levels for the non structural and recommended plan, and a 50 year period of analysis. The plans were analyzed and optimized using a risk-based approach in accordance with EC1105-2-205.

## 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. The analysis considered a range of possible values, with a maximum and a minimum value, for each economic variable used to calculate the elevation- or stage-damage curves, and for each hydrologic/hydraulic variable used to calculate the stage-frequency 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.

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.

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.

## ENGINEERING CONSIDERATIONS

Design considerations and cost estimates for the structural features of the project include canal improvements, the previously constructed West Diversion Detention Pond and the expansion of the Robert Boulevard Detention Pond. Because the area is highly urbanized, proposed improvements were designed to remain within existing rights-of-way to the extent possible. All necessary project rights-of-way are identified in the Real Estate Plan.

The Frequency-Based Design Storm option was used due to the absence of flow gage data for the potential flooding sources in 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.

The cost estimate was prepared utilizing TRACES MII 4.0. Project costs were based on October 2011 price levels. Sources of material prices are consistent with those used to develop unit costs in the MII unit cost book 2006 database, from updated data from recently constructed projects, or from budgetary quotes.

All of the construction work is common to MVN. It was assumed that most of the construction material and equipment required for the project would be truck delivered to the jobsite.

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 with plotted logs of the undisturbed borings presented on Plates B101 to B106 of the Engineering Investigations (Volume 2, Appendix C, Annex 3). 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) of the Engineering Investigations (Volume 2, Appendix C, Annex 3).

Contingencies for the cost estimate were calculated in accordance with Engineering and Construction Bulletin No. 2007-17, “Application of Cost Risk Analysis Method to Develop Contingencies for Civil Works Total Project Costs.” The guidance provided in this Engineering Bulletin indicates that a formal cost risk analysis shall be prepared for all decision documents requiring congressional authorization for projects exceeding $40 million. A cost and schedule risk analysis was not required for the reformulated project because the reformulated project costs ($23 million) do not exceed the $40 million threshold.

Three rates (low, intermediate, and high) of relative sea level rise (RSLR) projections were developed in accordance with EC 1165-2-11. Historic RSLR rates at a nearby USACE gage, USACE gage no. 85700, at the Rigolets, were used to determine the RSLR rates for the project

area. The subsidence rate in the study area is .5 ft/50 years. The stages for future with and without conditions are estimated for the intermediate sea level rise over the life of the project. 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 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.

## NATIONAL ECONOMIC DEVELOPMENT (NED) PLAN

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 accord 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, SELA's authorization requires only that the plan be shown to be technically sound, environmentally acceptable, and economic. The plan formulation process used for this study therefore did not employ an NED analysis; rather, the project delivery team sought to develop a technically sound, economically viable (i.e., benefit-to-cost ratio greater than 1.0) project consistent with protecting the Nation's environment.

As previously mentioned in this report, a non-structural option was analyzed within a risk-based framework to determine the economic feasibility of this option. It took the form of structure raising for all residential structures within the project-area's 100-year floodplain. This analysis assumes raising these residential buildings above the elevation of the stages associated with a 100-year storm event. The benefits associated with this option were defined as the reduction in damages that would otherwise occur from flooding caused by various storm intensities, up to a 100-year storm. For this analysis, critical variables were quantified (stage-frequency relationships, water depth-property damage relationships, structure and content values, and first floor elevations) through the development of probability distributions. Five hundred eighty-eight (588) residential buildings eligible to be raised were identified through this analysis. The total first costs of raising these residential buildings were estimated to be $74,731,000, or an average annual cost of $3,479,000 over the project's 50-year life. The expected annual benefits of residential building raising were estimated to be $5,023,000, leaving a net annual benefit of $1,544,000 and a benefit-

cost ratio of 1.44. These results assume 100 percent participation on the part of property owners whose properties are below the 100-year storm event elevation within the project area, and assume completion of the building-raising program within a period of one year. These assumptions are subject to revision based upon additional field research, which may cause the BC ratio for the structure-raising alternative to drop significantly.

While the cost-benefit ratio of the structure-raising alternative appears to be greater than the cost-benefit ratio of the proposed plan, practical considerations make the structure-raising alternative unfeasible. First, the practical difficulties presented by the challenge of raising 588 private residences are overwhelming: highly complex construction logistics, the hardship of finding scores of qualified contractors, legal obstacles presented by recalcitrant homeowners, possible opposition by the City, potential vandalism and crime in empty neighborhoods, unanticipated but likely cost overruns, and this option's absence of flood protection for commercial structures. Second, even at the projected cost of $74,700,000, the structure-raising alternative is more than three times the projected cost ($23,200,461) of the proposed plan. In the present climate of Congressional austerity, approval for the structure-raising alternative is judged to be far less likely than approval of the more frugal proposed plan; moreover, the structure-raising alternative would impose a significantly larger financial burden on the Non-Federal Sponsor.

## RECOMMENDED PLAN

### PLAN DESCRIPTION

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, incorporating an existing detention pond, expanding and incorporating another existing detention pond, constructing overflow weirs, and installing culverts. The estimated period of construction is three years.

The project has five (5) distinctive features: (1) existing 13.8 acre West Diversion Detention Pond the construction of which was begun by the city of Slidell in 1997 and completed in September 1998; (2) enlargement of the existing Robert Blvd. Detention Pond and construction of three lateral broad crested overflow weirs (100 feet) to allow excess flow from the W-14 Canal into the detention basin; (3) construction of a 10' wide earthen trapezoidal section beginning at Fremaux Avenue and ending at Daney Street with 10' wide bottom and 3H:1V side slopes (4) construction of a larger 40' wide earthen trapezoidal channel beginning at Daney Street and ending at Interstate 10 with a 40' wide bottom and 3H:1V slopes; and (5) and the clearing and snagging of the earthen channel from Interstate 12 to Fremaux Avenue. The specific project features are discussed in more detail below.

The Non-Federal Sponsor will be requesting credit for certain project features which have already been completed by the City of Slidell and St. Tammany Parish. Credit for work performed on this project prior to the execution of a PPA or other agreement with the Non-Federal Sponsor is authorized pursuant to Section 533 (b) of WRDA 1996 which provides in pertinent part as follows:

"The costs of any work performed by the non-Federal interest subsequent to the dates of the reports referred to in subsection (a) and determined by the Secretary to be a compatible and integral part of the projects shall be credited toward the non-Federal share of the projects." The reconnaissance report for St. Tammany Parish was completed in July 1996.

The Recommended Plan is shown on Plate 3 in the main report (Volume 1), Plates 1 - 5 of the Engineering Investigations (Volume 2, Appendix C, Annex 1). Implementation of the Recommended Plan would provide the desired flood reduction levels for a 10-year flood, which means in any year only a 10 percent chance exists that a storm could cause flooding that would reach or exceed the protective capacity of the proposed project system .

**Clearing and Snagging**. Approximately 11,135 feet of the existing W-14 Canal from Interstate 12 to Fremaux Avenue will be cleared and snagged to remove unwanted vegetation, trees, and debris.

**10' Wide Trapezoidal Channel**. The canal improvements from the downstream side of Fremaux Avenue to the upstream side of the Daney Street Bridge (approximately 2,960 ft in length) will include clearing and grubbing 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.

**40' Wide Trapezoidal Channel.** Improvements to the existing canal from the downstream side of the Daney Street Bridge to the upstream side of the Interstate 10 Bridge (approx. 6,400 ft in length) 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 40-ft bottom width with 3H:1V side slopes. This feature of work was recently constructed for St. Tammany Parish. The Non-Federal Sponsor will request credit for in-kind contributions for this feature of work.

**West Diversion Pond**. The West Diversion Detention Pond is located on the west side of U. S. Highway 11 near North Boulevard. This feature of work was constructed by the City of Slidell. Construction began in early 1997 and was substantially completed in September 1998. The construction of this detention pond consisted of clearing and excavation of a parcel of land (approx. 13.8 acres) for the 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 +5.00 to +4.25 feet. No additional improvements will be made to this existing detention pond. The Non-Federal Sponsor will request credit for in-kind contributions for this feature of work.

**Robert Boulevard Detention Pond & Weirs**. Improvements will be made to the existing Robert Boulevard Detention Pond along with the construction of weir just north of Robert Boulevard. The improvements will include deepening the bottom of the pond to elevation +1.5 ft and expanding the surface area by approximately 11.57 acres from 19.6 to 31.17 acres. The pond will have three lateral broad-crested weirs constructed to connect the W-14 Canal to the pond. The pond will be drained by two 24-inch reinforced concrete pipe (RCP) that are 25' in length with an invert at +1.5 feet.

Before the Non-Federal Sponsor can receive credit for the channel improvements of the portion of the W-14 Canal undertaken by the Parish from the downstream side of the Daney Street Bridge to the upstream side of the Interstate 10 Bridge (approx. 6,400 ft in length) and/or the construction of the 13.8 acre West Diversion Detention Pond by Slidell, the Non-Federal Sponsor must demonstrate that: (1) the work was performed after July 1996 (WRDA 1996); (2) that the work performed was a compatible and integral part of the project; and (3) and that the work is technically sound, environmentally acceptable and economic.

The Modified Charleston Method (MCM) model was used to evaluate the impacts of the Recommended Plan on the environment. The results of the MCM indicate that 148.5 credits/46 acres of pine savannah/bottomland hardwoods habitat would need to be acquired, managed, maintained, and monitored to appropriately mitigate for the project impacts. The unavoidable loss of 19.32 acres of mixed pine/bottomland hardwood habitat would be compensated through the acquisition, management, maintenance, and monitoring of a mitigation site, which has been coordinated with the interagency team and the non-Federal sponsor. As there are insufficient pine-savannah mitigation bank credits available, a mitigation plan centered on land acquisition and rehabilitation of the acquired property has been selected to meet project mitigation requirements. A mitigation plan has been prepared and is included as an appendix to the Environmental Assessment. The US Fish and Wildlife Service has recommended the Blossman #1 site as the priority property. It is approximately 52 acres of vacant land with trees with the boundaries adjacent to the Big Branch Marsh National Wildlife Refuge in St. Tammany Parish, Louisiana. While currently this is the preferred site for mitigation, further investigations and analyses will be performed during the design phase to ascertain the best available tract (or portion of track) to cover the required 46 acre mitigation requirements at a price that minimizes costs and optimizes mitigation success.

## PLAN ACCOMPLISHMENTS

The Recommended Plan would provide additional protection for urban flooding occurring in a portion of the city of Slidell located north of Lake Pontchartrain, south of Interstate Highway 12, east of U.S. Highway 11, and west of Interstate 10.

The Recommended Plan is generally designed to provide a level of protection for storms up to a 10-year return event for the W-14 Canal basin which is consistent with the protection provided to the surrounding areas throughout the Southeast Louisiana Project. The equivalent annual damages for commercial/residential structures would be reduced from $17,808,000 under the without project condition to $16,049,000 with the Recommended Plan in place, a decrease of about 10 percent. Implementation of the Recommended Plan would result in a $1,759,000 reduction in the average annual damages, in 2011 dollars.

Area residents should be reminded that the Recommended Plan is proposed to further reduce the risk of flood damages occurring in the project area, not to eliminate all risk. Residual risk is a term used to describe the remaining risk of flood and storm damage that is present for the project area after full implementation of the Recommended Plan. The economic analysis of the Recommend Plan compared total equivalent annual damages “without project” to “with project” conditions for each sub-basin (Appendix A, Economics, Table 10). The results show that even though the Recommend Plan reduces the risk flood damages, there still remains significant risk for this area.

Further risk reduction opportunities will be evaluated as part of future SELA efforts planned for this area including the SELA - Schneider Canal Hurricane Risk Reduction effort. In addition, this risk information included with this report will further assist the local communities with planning and prioritizing other non-Federal risk reduction efforts as well as communicating remaining risks with residents and businesses.

Louisiana is constantly losing land to subsidence, sea level rise, and erosion and these factors were evaluated during the analysis of the Recommended Plan benefits. These factors, along with a multitude of other variables, make it impossible to eliminate all risk of storm and/or flood damage for this area. Even after full implementation of the Recommended Plan, there are things that can be done to further reduce residual risk, such as:

- Heeding evacuation orders
- Restoring wetlands and barrier islands
- Raising buildings and make them flood-proof
- Relocating buildings to higher ground
- Purchasing insurance

History shows that storm and flood risks change over time. This is a result of changing weather patterns, land use patterns and/or performance of storm or flood protection projects. Over the course of a project's life, conditions may differ from those anticipated during pre-project planning. There is a risk of flooding every year from rainfall and storm surge and everyone shares in the responsibility to "buy down" risk through zoning, building codes, insurance and other measures.

Responsibility for flood risk management in the United States is a shared responsibility between multiple Federal, State, and local government agencies with a complex set of programs and authorities. Nationally, both the US Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) have programs to assist states and communities in reducing flood damages and promoting sound flood risk management. The authority to determine how land is used in floodplains and to enforce flood-wise requirements is entirely the responsibility of state and local government. Floodplain management choices made by state and local officials, in turn, impact the effectiveness of federal programs to mitigate flood risk and the performance of federal flood damage reduction infrastructure. One key challenge is to ensure that as the public and government leaders make flood risk management decisions, they integrate environmental, social, and economic factors and consider all available tools to improve public safety. Importantly, we must ensure the public is educated both as to the risks they face and actions they can take to reduce their risks. Because of this complex arrangement of responsibilities, only a life-cycle, comprehensive and collaborative systems approach will enable communities to sustain an effective reduction of risks from flooding.

## SUMMARY OF ECONOMIC ANALYSIS

The project first cost of the Recommended Plan, at 2011 price level, is $21,952,440. (The project first cost consists of all project costs plus contingency costs before escalation is added to obtain the total project costs. These costs are developed in the MCACES cost estimate. This information can be found in Annex 9 of Appendix C – Engineering Investigations.)

Average annual costs were determined using a period of analysis of 50 years and a Federal discount rate of 4 percent. The benefit cost ratio is 1.55 at this price level, with net annual benefits of $627,000. The period of construction for the Recommended Plan is approximately three years. The total costs for the Recommended Plan are presented below in Table 9.

Table 9
W-14 Canal Improvements
Recommended Plan, MCACES Cost[1]

| | |
|---|---|
| Project First Cost | $21,952,440 |
| Equivalent Annual Benefits | $ 1,759,000 |
| Total Average Annual Cost | $ 1,132,000 |
| Interest and Amortization | $ 1,101,000 |
| Operations and Maintenance | $ 31,000 |
| Net Annual Benefits | $ 627,000 |
| | |
| Benefit Cost Ratio | 1.55 |

[1] Based on 2011 price levels with a period of analysis of 50 years and a Federal discount rate of 4%.

**ENGINEERING DESIGN**

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 detention pond, constructing overflow weirs, and installing culverts. These features of work are of a type designed and constructed by the New Orleans District in the past. The designs were prepared with the benefit of detailed surveys and soil borings. The structural components shall be designed in accordance with the applicable portions of the Corps of Engineers manuals for engineering and design. The estimated costs were based upon an analysis of each line item evaluating quantity, production rate, and time, together with appropriate equipment, labor, and material costs.

All the construction work (e.g. excavation, pilings, structural steel, and piping) is familiar to the New Orleans District. In addition, some of the construction materials – including concrete, steel sheet piling, and structural steel are available locally. All construction material required for the project would be truck delivered to the job site.

The cost estimate for the W-14 Canal SELA St. Tammany Parish study was prepared utilizing TRACES MII 4.0 Micro-Computer Aided Cost Estimating System. A cost and schedule risk analysis was not required for this project as it does not meet the $40 million threshold required for a cost and schedule risk analysis.

Additional details on the design of the flood control features can be found in the Engineering Investigations Appendix (Volume 2, Appendix C, Annexes 4 - 7).

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 (approximately 11,135 ft in length).

Fremaux Avenue to Daney Street: 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).

Daney Street to Interstate 10: 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 Non-Federal Sponsor will request credit for in-kind contributions for this feature of work. Work performed on this project prior to the execution of a PPA or other agreement with the Non-Federal Sponsor is eligible for Work-in-Kind credit as authorized pursuant to Section 533(a) and (b) of WRDA 1996, as discussed above.

DETENTION PONDS

West Diversion Detention 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 +5.00 to +4.25 feet. The Non-Federal Sponsor will request credit for in-kind contributions for this feature of work. Work performed on this project prior to the execution of a PPA or other agreement with the Non-Federal Sponsor is eligible for Work-in-Kind credit as authorized pursuant to Section 533(a) and (b) of WRDA 1996, as discussed above.

Robert Boulevard Detention Pond and Weir: Improvements to an existing 19.6 acre detention pond and construction of a weir just north of Robert Boulevard will include deepening the bottom of the pond to elevation +1.5 ft and expanding the surface area by approximately 11.57 acres from

19.6 to 31.17 acres. The pond will have three lateral broad-crested weirs constructed to connect the W-14 Canal to the pond. The pond will be drained by two 24-inch reinforced concrete pipes that are 25' in length with an invert at +1.5 feet.

RELOCATIONS (Utilities and Florida Avenue Bridge)

Many relocations will be required in the implementation of the project consisting of gas, water, and sewer pipelines, and power and communication lines. In addition, the replacement of the Florida Avenue bridge will also be a relocation cost and not a project cost. The Non-Federal Sponsor is responsible for providing all lands, easements, relocations, rights-of-way, and suitable borrow and excavated material disposal areas (LERRDs), 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. The Non-Federal Sponsor will contact each facility owner to obtain their final relocation plans. These plans shall accommodate the project and include a detailed schedule of work. If necessary, the affected owners will acquire any relocations right-of-way. Relocations will generally be performed prior to contract advertisement.

The costs associated with the performance or construction of utility relocations are estimated to be $424,229.

The Non-Federal Sponsor's cost associated with the relocation of the Florida Avenue Bridge is estimated at $1,797,819. Both the utility and bridge relocations represent fully funded dollars. See Real Estate Plan, Volume 2, Appendix D for more detail.

DETAILED COST ESTIMATE

The total estimated first cost at October 2011 price level is $21,952,440. A cost and schedule risk analysis was not required for this project as it does not meet the $40 million threshold required for a cost and schedule risk analysis. The detailed cost estimate (including contingency and escalation) is shown in the Engineering Investigations (Volume 2, Appendix C, Annex 9).

**REAL ESTATE CONSIDERATIONS**

The study area includes approximately 5500 acres located on the north shore of Lake Pontchartrain in St. Tammany Parish. The Coastal Protection and Restoration Authority of Louisiana (CPRA) will serve as the non-Federal sponsor for the project. Construction would occur mainly within existing St. Tammany Parish and City of Slidell rights-of-way. The project will require acquisition of three standard estates: Fee Excluding Minerals (with Restriction on the Use

of the Surface), Perpetual Channel or Channel Improvement Easement, and Temporary Work Area Easement for three years.

There is 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. There are no churches, schools or cemeteries within the project area that would be affected. Since the land needed for the project does not lie along a natural navigable stream, the navigational servitude would not be invoked. There is no merchantable timber on the land. Minerals are not needed for project purposes. Access to the area would be through major highways and city streets.

Information on the real estate requirements is presented in the Real Estate Plan, Volume 2, Appendix D.

**OPERATION, MAINTENANCE, REPAIR, REPLACEMENT AND REHABILITATION (OMRR&R) CONSIDERATIONS**

The non-Federal sponsor will maintain and operate the channel, bridge, and detention pond improvements in conformance with the Project Partnership Agreement (PPA) for this project. The Government will periodically inspect the project features and review the local interest programs in regard to the proper operation and maintenance of the project. Annual operation and maintenance cost estimates for channel, bridge, and detention pond improvements were included in the average annual costs of the project for economic analysis. Operation, maintenance, repair, replacement, and rehabilitation costs (OMRR&R) are estimated to be approximately $31,000 per year. The OMRR&R costs were calculated as follows:

- Approximately 4.1 miles of clearing & snagging and debris removal from the drainage channels will be required. It was assumed that channel maintenance will require removal of silt and debris build up (once every 10 years): Typical costs are $60,000/mi/10 year cycle or $6,000 mi/year. Therefore, 4.1 miles x $6,000/mi = $24,600/year.

- The Robert Blvd. detention pond has two-24 inch culverts to drain the pond. Each culvert is estimated at approximately. $1,000/year for cleaning out (3 times/year, plus greasing and painting once every 10 years): Therefore, 2 culverts x $1,000/year = $2,000/year.

-. There are no O&M costs for the bridges, detention ponds, or weirs other than periodic inspections. RR&R costs have not been included as they are a NFS responsibility.

- A 15% contingency was applied to the OMRR&R costs.

## SOCIAL, ENVIRONMENTAL, HTRW, AND PUBLIC INTEREST EFECTS

The draft supplemental Environmental Assessment (SEA #409A) was released for public review and comment to federal, state, and local agencies and the general public in November 2011. SEA #409A went to out for public review on November 28, 2011. Documentation of comments are presented in Volume 2, Appendix B, Environmental Supporting Documentation.

### SOCIAL EFFECTS

Implementation of the Recommend Plan would reduce flood damages for the residents, businesses, and industries of the study area. Providing the area with protection would reduce the number of flood insurance claims. There may be minor, temporary degradation of air, water quality, and temporary noise impacts during construction. Appropriate control measures would be utilized to reduce noise and dust generation.

### ENVIRONMENTAL EFFECTS

The significant resources that are evaluated in the environmental assessment are air quality, water quality, aquatic resources, wetlands, mixed pine/bottomland hardwood forest, wildlife, threatened or endangered species, socioeconomics, environmental justice, cultural, recreation, aesthetics, and hazardous, toxic, and radioactive waste. The Modified Charleston Method (MCM) model, was used to evaluate the impacts of the recommended plan on the environment. The loss of 19.32 acres of mixed pine/bottomland hardwood habitat would be compensated through the fee acquisition, management, maintenance, and monitoring of a 46-acre mitigation site, located adjacent to the Big Branch Marsh National Wildlife Refuge in St. Tammany Parish, which has been coordinated with the interagency team and the non-Federal sponsor. The proposed action would have no significant impacts on the following resources: air quality, water quality, aquatic resources, wetlands, wildlife, threatened or endangered species or their critical habitats, socioeconomic resources, cultural resources, recreational resources, and aesthetic resources.

### HTRW EFFECTS

The probability is low of encountering HTRW during the course of canal improvement work, except in dredged sediments. The dredged material from the W-14 Canal between Fremaux Avenue and Daney Street may present the possibility of exposure to petroleum hydrocarbons. However, all dredged material will be placed in an appropriate landfill. If HTRW impacted sediments are found, proper stopwork, handling and disposal protocol would be followed. All analyses will be compared to Louisiana’s Risk Evaluation and Corrective Action Plan document.

PUBLIC INTEREST EFFECTS

The Recommended Plan would provide a level of flood protection to residents and businesses located within the W-14 Canal basin. Noise impacts may cause a temporary inconvenience to residents and facilities in the immediate area. Temporary impacts would occur to traffic patterns and utilities. These would be minimal and would only occur during construction. Traffic would be re-routed to adjacent streets during construction. Street closures and re-routing plans would be coordinated with the City of Slidell Department of Public Works to ensure that city services and safety operations are maintained at all times. Signs will be posted for traffic detours to direct drivers around the construction areas.

## SUMMARY OF CONSIDERATIONS

Based on the above information and analysis, the Recommended Plan is in accordance with the St. Tammany Parish, Louisiana Reconnaissance Study, July 1996, and can be implemented under the existing SELA Project authority. The authority states "No funds may be obligated … until the Corps of Engineers determines that the additional work to be carried out with such funds is technically sound, environmentally acceptable, and economic, as applicable." The preliminary engineering design of the recommended plan has been completed, reviewed and determined to be technically sound. The Supplemental Environmental Assessment (SEA #409A) has been completed and confirmed that the recommended plan is environmentally acceptable. The economic analysis determined that the recommended plan provides a benefit-to-cost ratio of 1.55 to 1.0 confirming that the plan is economic. As such, approval of this report by the appropriate Corps office will further signify that the three (3) conditions precedent to implementation are met. A Project Partnership Agreement must be executed with CPRA prior to proceeding with the work recommended in this report.

# PLAN IMPLEMENTATION

## INTRODUCTION

The purpose of this section is to present pertinent information concerning the Federal and non-Federal responsibilities regarding cost apportionment and the division of responsibilities for construction and subsequent operation and maintenance of the recommended project. Such cost apportionment is based on Federal legislative and administrative policies.

## COST APPORTIONMENT

All costs associated with the construction and subsequent operation and maintenance of the Recommended Plan will be allocated to flood protection. Section 108 of EWDA 1996 Public Law

104-46 and WRDA 1996 Public Law 104-303 (Section 533) specify that the cost sharing requirements be 75% Federal and 25% non-Federal. The non-Federal sponsor's share shall consist of a cash contribution of not less than 5 percent of the cost of the project features. The balance of such non-Federal sponsor share may take the form of a combination of cash and credit for the fair value of lands, easements, or rights-of-way, or any form of in-kind contribution to the project found eligible for credit. In addition, all OMRR&R costs are a 100 percent non-Federal responsibility.

Table 10 (Federal and Non-Federal Cost Share Breakdown) provides the estimated distribution of costs for the W-14 Canal Improvements feature of the Project. Cost estimators will work closely with the non-Federal sponsor to identify creditable in-kind work completed or scheduled, as well as future efforts. The non-Federal sponsor will reevaluate this breakdown as the engineering and design of the project progresses, to assess the need to shift efforts from one project component to another in an attempt to achieve their required cost-share.

TABLE 10

| FEDERAL AND NON-FEDERAL COST BREAKDOWN | | | |
|---|---|---|---|
| FULLY FUNDED | | | |
| Item | Federal $ | Non-Fed $ | Total $ |
| Lands & Damages | - | 7,412,824 | 7,412,824 |
| Relocations - Utilities & Bridges | - | 2,222,048 | 2,222,048 |
| Channels & Canals | 3,611,207 | - | 3,611,207 |
| Floodway Control & Diversion Structure | 6,639,470 | - | 6,639,470 |
| PED | 1,273,467 | - | 1,273,467 |
| Construction Mgmt | 1,590,497 | - | 1,590,497 |
| Cash Contribution (5%) | (1,137,476) | 1,137,476 | |
| Additional Cash or WIK | - | - | - |
| Total | 11,977,166 | 10,772,348 | 22,749,514 |

The Non-Federal Sponsor, the Coastal Protection and Restoration Authority of Louisiana (CPRA), which has been granted authority to administer the project, will request authorization for work-in-kind. Before the Non-Federal Sponsor can receive credit for the channel improvements that have already been made to the portion of the W-14 Canal from the downstream side of the Daney Street Bridge to the upstream side of the Interstate 10 Bridge (approx. 6,400 ft in length) and/or the construction of the 13.8 acre West Diversion Detention Pond, the Non-Federal Sponsor

must demonstrate that: (1) the work was performed after July 1996 (WRDA 1996); (2) that the work performed was compatible and integral to the project; (3) that the work is technically sound, environmentally acceptable and economic; and (4) that the entity or person that performed the work was granted written permission for the Non-Federal Sponsor to receive credit for that work. The non-Federal share of the total project cost is estimated at $10,772,348. The total cost to acquire all lands, easements, rights-of-way, relocations, and disposal areas (LERRDs) for the W-14 Canal Improvements Project is estimated at $7,412,824. The non-Federal sponsor is also required to accomplish or arrange for the accomplishment of all facility relocations. The cost for facility relocations is estimated at $2,222,048, thereby bringing the total costs of LERRDs to $9,634,872. The non-Federal sponsor will provide an estimated cash contribution of $1,137,476 and intends to perform work-in-kind and provide additional cash to satisfy the remainder of the non-Federal share.

**DIVISION OF RESPONSIBILITIES**

Federal Responsibilities. The Federal government will be responsible for planning, engineering, design, and construction of the project in accordance with the provisions of WRDA 1996.

Non-Federal Responsibilities. In accordance with Federal policy, non-Federal interests must, at the appropriate time, assure the Secretary of the Army that they will without cost to the United States:

1. Provide a minimum of 25 percent, but not to exceed 50 percent of total project costs assigned as further specified below:

a. Provide 25 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

b. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;

c. Provide, during construction, a contribution equal to 5 percent of total project costs;

d. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations (including bridges); and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of

dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;

e. Provide, during construction, any additional funds necessary to make its total contribution equal to 25 percent of total project costs;

2. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purposes is authorized;

3. Not less than once each year, inform affected interests of the extent of the protection afforded by the project;

4. Agree to participate in and comply with applicable Federal flood plain management and flood insurance programs;

5. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project partnership agreement, and to implement such plan not later than one year after completion of construction of the project;

6. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

7. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

8. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or

excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

9. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

10. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor owns or controls for access to the project for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the project;

11. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

12. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20.

13. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq*);

14. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances

regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-150, as amended (42 USC 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the Non-Federal Sponsor with prior specific written direction, in which case the non-Federal Sponsor shall perform such investigations in accordance with such written direction;

15. Assume, as between the Federal Government and the Non-Federal Sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on or under lands, easements, or rights-of-way that the Federal Government determines to be required for the construction, operation, or maintenance of the project;

16. Agree, as between the Federal Government and the non-Federal Sponsor, that the non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

17. Comply with Section221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

## LOCAL COOPERATION

The terms of local cooperation will be in accordance with the Project Partnership Agreement to be executed by the CPRA for the Southeast Louisiana, St. Tammany Parish Project for the construction of the W-14 Canal Improvements Project.

## VIEWS OF LOCAL SPONSOR

The W-14 Canal Basin study area, which is located on the northshore of Lake Pontchartrain, is located in St. Tammany Parish. The St. Tammany Parish Government is responsible for providing urban flood protection to the residents of St. Tammany Parish. Close coordination has

been maintained with the St. Tammany Parish Government and the city of Slidell throughout the planning process and they expressed their support for the project. The Coastal Protection and Restoration Authority of Louisiana (CPRA) supports the project, will serve as the non-Federal sponsor, and is prepared to sign a PPA to proceed with the W-14 Canal Improvements Project. A letter of intent dated January 6, 2012 has been received by USACE from CPRA expressing its intent to be the non-Federal sponsor. A copy of this letter is included in Exhibit 1 of the main report.

## PRELIMINARY FINANCING NEGOTIATIONS

CPRA is the Non-Federal Sponsor and has provided a self-certification of financial capability which is included in this Report as Exhibit 2. Several meetings have been held between the USACE, CPRA, the City of Slidell and the St. Tammany Parish Government. The purpose of these meetings was to discuss the Recommended Plan, estimated project cost, and cost sharing responsibilities. The incremental cost share percentages are presented in Table 11. A breakdown of the Federal and non-Federal expenditures by fiscal year, based on the total project cost is presented in Table 12. A detailed breakdown of the total project cost by construction contract is presented in Table 13.

TABLE 11
SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
W-14 CANAL IMPROVEMENTS
COST SHARE PERCENTAGES

| | TOTAL ($) |
|---|---|
| LERRDS | 9,634,872 |
| SCHEDULED CONSTRUCTION | 13,114,642 |
| | |
| TOTAL PROJECT COST | 22,749,514 |
| | |
| | |
| NON-FED 47.35% SHARE | 10,722,348 |
| CASH 5% of TPC | 1,137,476 |
| LERRDS | 9,634,872 |
| | |
| FED 52.65% SHARE | 11,977,166 |

| | | | | | TABLE 12 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | W-14 Canal Improvements | | | | | | | |
| | | SCHEDULE OF ESTIMATED FEDERAL AND NON-FEDERAL EXPENDITURES | | | | | | | | | | |
| | | | | | FULLY FUNDED | | | | | | | |
| | | | | | | | <<<<<<<<<<<<<<<<<<<< | | NON-FEDERAL | >>>>>>>>>>>>>>>>>> | | TOTAL |
| Fiscal Year | tpc | Work-In-Kind Credit | LERRD | Scheduled Construction | % | 5% TPC Cash | Cash > 5% of TPC | Allocation of Credit to Cash >5% | W-I-K Credits Remaining | Net Cash >5% of TPC | NON-FED CASH | FED CASH |
| | | | | | | | | | - | - | - | - |
| 2013 | 4,024,779 | | 3,706,412 | 318,367 | 2.43% | 27,618 | - | | - | 0 | 27,618 | 290,749 |
| 2014 | 13,489,721 | | 4,775,014 | 8,714,708 | 66.45% | 755,853 | - | | - | 0 | 755,853 | 7,958,855 |
| 2015 | 3,683,523 | | 1,068,602 | 2,614,922 | 19.94% | 226,801 | - | | - | 0 | 226,801 | 2,388,121 |
| 2016 | 1,551,490 | | 84,846 | 1,466,645 | 11.18% | 127,204 | - | | - | 0 | 127,204 | 1,339,441 |
| | | | | - | 0.00% | 0 | - | | 0 | 0 | - | 0 |
| | | - | | - | 0.00% | 0 | - | | | - | - | 0 |
| | | - | | - | 0.00% | 0 | - | | | | | |
| total | 22,749,514 | - | 9,634,872 | 13,114,642 | 100.00% | 1,137,476 | - | - | 0 | - | 1,137,476 | 11,977,166 |

TABLE 13

# W-14 CANAL EXPENDITURE SCHEDULE
# FULLY FUNDED

Current 2011 Price Level - Base Year 2016

| Item # | Feature of Work | FY2013 | FY 2014 | FY 2015 | FY 2016 | TOTAL |
|---|---|---|---|---|---|---|
| 1 | 09 - 10' Channel Improv | | 399,575 | | | 399,575 |
| 2 | 09 - 40' Channel Improv | | 2,959,512 | | | 2,959,512 |
| 3 | 09 -Clear and De-Snag Channel | | 252,120 | | | 252,120 |
| 4 | 15 - Robert Blvd Detention Pond & Weir | | 1,660,356 | 1,660,356 | 830,178 | 4,150,891 |
| 5 | 15 - West Diversion Pond & Weir | | 2,488,579 | | | 2,488,579 |
| 6 | 01 - Real Estate | 3,706,412 | 3,706,412 | | | 7,412,824 |
| 7 | 02 - Relocations | | 169,692 | 169,692 | 84,846 | 424,229 |
| 8 | 02 - Florida Avenue Bridge | | 898,910 | 898,910 | | 1,797,819 |
| 9 | 30 - PED | 318,367 | 318,367 | 318,367 | 318,367 | 1,273,467 |
| 10 | 31 - Construction Mgmt | | 636,199 | 636,199 | 318,099 | 1,590,497 |
| | TOTAL | 4,024,779 | 13,489,721 | 3,683,523 | 1,551,490 | 22,749,514 |

## NON-FEDERAL SPONSOR CREDIT FOR WORK-IN-KIND

The non-Federal sponsor may be entitled to receive credit, as part of the non-Federal share of the cost of the recommended plan, for any work accomplished subsequent to the reports cited in the authorization, as determined by the Secretary of the Army to be compatible and integral part of the Southeast Louisiana Project. Credit for work performed on this project prior to the execution of a PPA or other agreement with the Non-Federal Sponsor is authorized pursuant to Section 533(b) of WRDA 1996.

The extent of WIK credit for design and construction will be limited to the non-Federal share of total project cost. Actual credit for WIK will be evaluated based on documentation provided by the non-Federal sponsor and inspection of the WIK by the New Orleans District. Any work-in-kind credit documentation submitted by the NFS subsequent to the approval of the recommended plan must describe in detail the work performed and be shown to have been performed after July 1996. The work will be reviewed to confirm that it is integral to the recommended plan and technically sound, environmentally acceptable and economic. All documentation provided by the non-federal Sponsor will also be thoroughly reviewed to determine reasonableness, allocability, and allowability of costs. Upon completion of review, a financial audit will be conducted prior to granting final credit. Coordination will continue throughout the design and construction period between the New Orleans District and the non-Federal sponsor for all WIK performed.

## ASSESSMENT OF FINANCIAL CAPABILITY

A breakdown of the Federal and non-Federal share of the total project cost is displayed by fiscal year in Table 12. As shown, the largest non-Federal outlay for any year during the construction of the project is approximately $755,852.60 in FY 14.

The St. Tammany Parish Government has been an active participant throughout the study. CPRA has been an active participant in the study process as well as the currently approved work as the state local sponsor for the overall SELA project. The CPRA has provided the Corps with a letter of intent indicating that the agency understands and accepts the responsibilities incumbent on the non-Federal sponsor. CPRA has also executed a self-certification of financial capability attached as Exhibit 2. CPRA intends to enter into a binding PPA with the Corps at the appropriate time.

## CONCLUSIONS

The Recommended Plan to provide urban flood control protection to that portion of the city of Slidell in St. Tammany Parish, between Interstate 12 and Interstate 10, as developed in this report, is based on a thorough analysis and evaluation of all practicable alternatives in view of applicable economic, engineering, and environmental criteria. Through iterative analysis using hydraulic modeling, the proposed plan for the W-14 Canal Improvements project providing a 10-year level of protection, which means the flood protection has a 10 percent chance of being equaled or exceeded in any given year, was determined to be economically justified and environmentally acceptable. The W- 14 Canal Improvements project is recommended for implementation.

I have considered all significant aspects of the Recommended Plan from the perspective of the public interest, including environmental, social, economic and engineering feasibility. I have also given consideration to the risk and uncertainties associated with the unpredictability of floods, the potential for loss of life and property, and the human suffering that urban flooding could cause in a particular area. I have also considered the fact that the Southeast Louisiana (SELA) Project has been authorized to provide for 10-year level of protection for the project area and that any plans in addition to the previously authorized plans should offer the same.

I have weighed the benefits to be obtained from the Recommended Plan against the associated costs, and have considered the alternatives, impacts and scope. In my judgment implementing the Recommended Plan would provide increased levels of protection to the W-14 Canal basin consistent with the SELA standard, thereby improving flood protection to the 10-year storm level for approximately 16,375 residents. The total project first cost of the Recommended Plan for the W-14 Canal Improvements project is estimated to be $21,952,440. The recommended plan with estimated annual average costs of $1,132,000, and mean equivalent annual benefits of $1,759,000, provides a benefit-to-cost ratio of 1.55 to 1.0. The W-14 Canal Improvements project, as recommended, provides flood damage protection for approximately 6,156 residential structures located within the 100 year floodplain of the W-14 Canal Improvements project.

Minor, temporary adverse impacts on the water quality of the canal, aquatic resources, aesthetics resources, and socioeconomics would occur. No adverse impacts to air quality, threatened or endangered species, cultural resources or recreational resources are projected. However, direct impacts to mixed pine/bottomland hardwood forest of the proposed project include approximately 7.32 acres required to make canal improvements, 11.7 acres to expand the Robert Boulevard Detention Pond, and 0.3 acres to improve a perimeter levee in the West Diversion Detention Pond, a total of 19.32 acres. The direct effects to wildlife from construction of the canal improvements would be the permanent destruction of 3.2 acres (excluding temporary impacts) of habitat by mechanical clearing and grubbing activities (included as part of the 7.32 acres described above). The loss of the

19.32 acres will be mitigated by fee purchase of approximately 52 acres of vacant land adjacent to the Big branch Marsh National Wildlife Refuge in St. Tammany Parish with the restoration of 46 acres of pine savannah habitat from the mitigation site. The unavoidable loss of 19.32 acres of mixed pine/bottomland hardwood habitat would be compensated through the acquisition, management, maintenance, and monitoring of a mitigation site, through coordination with the interagency team and the non-Federal sponsor. As insufficient pine-savannah mitigation bank credits are available within the watershed, a mitigation plan centered on land acquisition and rehabilitation of property is appropriate to meet project mitigation requirements. The mitigation plan is included as an appendix in the Environmental Assessment.

Section 108 of the EWDA 1996 and Section 533 of WRDA 1996, as amended, provide a general and continuing authorization for engineering, design, and construction of SELA projects. Accordingly, any work within the W-14 Canal basin of St. Tammany Parish that is in accordance with the St. Tammany Parish, Louisiana Reconnaissance Report, July 1996, can be implemented under the existing SELA Project authority once a determination that the conditions precedent to implementation, as required by Section 533(d) of WRDA 1996, have been met. Based on the information and analysis contained in this Report, the Recommended Plan is within the authority conferred by Section 533 of WRDA 1996 and does not require additional Congressional authorization. Approval of this report by the appropriate Corps office will signify that the conditions precedent to implementation (i.e., the work is technically sound, environmentally acceptable, and economic) have been met. Subsequent to approval of this Report, a PPA must be executed with CPRA prior to proceeding with the work recommended in this Report.

## RECOMMENDATIONS

As the District Engineer, I have considered the significant environmental, social, and economic effects, and engineering feasibility and have determined that the Recommended Plan presented in this report is in the overall public interest and is technically sound, environmentally acceptable, and economically feasible. The Recommended Plan has a favorable benefit to cost ratio of 1.55 to 1.0.

I recommend that the W-14 Canal Improvements Project as described in this report be implemented under existing authority of the Southeast Louisiana Project, as authorized by Section 108 of the Fiscal Year 1996 Appropriations Act, Public Law 104-46, and Section 533 of Water Resources Development Act of 1996, Public Law 104-303, as amended. Further, I recommend that this Report serve as the basis for executing a PPA for the SELA W-14 Canal Improvements Project. This Plan is recommended with such modifications as the Division Engineer may find advisable and in accordance with existing cost sharing and financing requirements.

The total first cost of the project, based on 2011 price levels, is estimated at $21,952,440 with annual operation, maintenance, repair, rehabilitation, and replacement costs at $31,000. The recommended plan produces net excess benefits over costs and has a favorable benefit to cost ratio of 1.55 to 1.0.

I further recommend that the non-Federal sponsor be allowed to receive credit, toward the non-Federal share of the project, for engineering and design work proposed to be done by the non-Federal interests and determined by the Secretary of the Army to be a compatible and integral part of the project.

The work proposed to be done by the non-Federal sponsor, and the credit which the non-Federal sponsor seeks to contribute to its share of project costs, will be set forth in the Project Partnership Agreement package. Credit for work performed on this project prior to the execution of a PPA or other agreement with the Non-Federal Sponsor is authorized pursuant to Section 533(b) of WRDA 1996 which provides in pertinent part as follows:

"The costs of any work performed by the non-Federal interest subsequent to the dates of the reports referred to in subsection (a) and determined by the Secretary to be a compatible and integral part of the projects shall be credited toward the non-Federal share of the projects."

This recommendation and implementation of the Recommended Plan is also subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies, including the requirements enumerated in detail above, under "Division of Responsibilities".

1. Provide a minimum of 25 percent, but not to exceed 50 percent of total project costs assigned as further specified below:

a. Provide 25 percent of design costs in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

b. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs;

c. Provide, during construction, a contribution equal to 5 percent of total project costs;

d. Provide all lands, easements, and rights-of-way, including those required for relocations, the borrowing of material, and the disposal of dredged or excavated material; perform or ensure the performance of all relocations (including bridges); and construct all improvements required on lands, easements, and rights-of-way to enable the disposal of dredged or excavated material all as determined by the Government to be required or to be necessary for the construction, operation, and maintenance of the project;

e. Provide, during construction, any additional funds necessary to make its total contribution equal to 25 percent of total project costs;

2. Shall not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the non-Federal obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that expenditure of such funds for such purposes is authorized;

3. Not less than once each year, inform affected interests of the extent of the protection afforded by the project;

4. Agree to participate in and comply with applicable Federal flood plain management and flood insurance programs;

5. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a non-Federal interest to prepare a floodplain management plan within one year after the date of signing a project partnership agreement, and to implement such plan not later than one year after completion of construction of the project;

6. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in adopting regulations, or taking other actions, to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

7. Prevent obstructions or encroachments on the project (including prescribing and enforcing regulations to prevent such obstructions or encroachments) such as any new developments on project lands, easements, and rights-of-way or the addition of facilities which might reduce the level of protection the project affords, hinder operation and maintenance of the project, or interfere with the project's proper function;

8. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the construction, operation, and maintenance of the project, including those necessary for relocations, the borrowing of materials, or the disposal of dredged or excavated material; and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

9. For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

10. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor owns or controls for access to the project for the purpose of completing, operating, maintaining, repairing, rehabilitating, or replacing the project;

11. Hold and save the United States free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the United States or its contractors;

12. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, or other evidence are required, to the extent and in such detail as will properly reflect total project costs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for

Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20.

13. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto; Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army"; and all applicable Federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq*);

14. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-150, as amended (42 USC 9601-9675), that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for construction, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the Non-Federal Sponsor with prior specific written direction, in which case the non-Federal Sponsor shall perform such investigations in accordance with such written direction;

15. Assume, as between the Federal Government and the Non-Federal Sponsor, complete financial responsibility for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on or under lands, easements, or rights-of-way that the Federal Government determines to be required for the construction, operation, or maintenance of the project;

16. Agree, as between the Federal Government and the non-Federal Sponsor, that the non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA; and

17. Comply with Section221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5b), and section 103(j) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213(j)), which provides that the Secretary of

the Army shall not commence the construction of any water resources project or separable element thereof, until each non-Federal interest has entered into a written agreement to furnish its required cooperation for the project or separable element.

The recommendations contained herein reflect the policies governing formulation of this project and the information available at this time. They do not necessarily reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program. Consequently, the recommendations may be modified to reflect Administration and Congressional direction and overall budgetary objectives.

Edward R. Fleming
Colonel, US Army
District Commander

**EXHIBITS**

**EXHIBIT 1**

Letter of Intent from CPRA

CPRA
Coastal Protection and
Restoration Authority of Louisiana

# State of Louisiana

BOBBY JINDAL
GOVERNOR

January 6, 2012

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

Dear Colonel Fleming:

This letter is in reference to the New Orleans District's investigations of drainage improvements in the W-14 Canal basin in Slidell, as prosecuted under the Southeast Louisiana Urban Flood Damage Reduction (SELA) project. The State of Louisiana, through the Coastal Protection and Restoration Authority of Louisiana (CPRA) is pleased to offer its general support of the W-14 Canal project. The proposed 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 the Florida Avenue Bridge.

This letter, while not legally binding on the State as an obligation of future funds appropriated by the State Legislature, declares our full support for the SELA, W-14 Project Section 533(d) project as described in the draft report dated December 2011. As the non-Federal sponsor for the ongoing SELA projects in Jefferson and Orleans Parishes, the CPRA is aware of the non-Federal sponsor's responsibilities to cost share total project costs, for the acquisition of all necessary lands, easements, rights-of-way, relocations, and disposal areas (LERRD's), and to provide operations and maintenance once construction is complete. The CPRA understands that the first cost of the proposed project is estimated to be $22,315,886, of which the non-Federal sponsor will be responsible for 25 percent or $5,578,972.

Accordingly, the CPRA acknowledges the responsibilities of the non-Federal Sponsor and will support the W-14 Canal project as the non-Federal sponsor and a project partner if it is called upon and is legally obligated to act as said sponsor. Should it be called upon to act as the sole non-Federal sponsor, it should be noted that CPRA fully intends and will be required under Louisiana law to enter into new agreements with or modify existing SELA agreements to add the St. Tammany Parish Government (STPG) in order to have that political subdivision be delegated and/or assume all or part of its responsibilities as the non-Federal Sponsor. Nonetheless, CPRA's acknowledgement and support herein should not be considered as supporting the current Federal position that the Corps has the legal authority to require CPRA to act as the non-Federal sponsor for internal urban drainage projects such as SELA and is made with the support of STPG in an effort to move the W-14 Canal project forward in light of the Corps refusal to change its position on non-Federal sponsorship of the various SELA projects in the New Orleans area. The CPRA fully supports the position of the STPG that it desires to act as the sole non-

Federal sponsor or in the alternative, to act as a co-non-Federal sponsor with the CPRA. Therefore, CPRA reserves the right to seek the enactment of Federal law or changes in Corps' regulations and/or guidance with regard to the issue of which local and/or state entities may act as the non-Federal sponsor for these projects.

The State of Louisiana and the Coastal Protection and Restoration Authority whole-heartedly endorse this and other Corps' efforts with regard to the SELA Project and we look forward to working with the Corps on the implementation of these important projects.

Respectfully,

Garret Graves
Chair
Coastal Protection and Restoration Authority

CC: Jerome Zeringue, Executive Director, OCPR
Cliff Bingham, General Counsel, Office of the Governor – Coastal Activities
David Peterson, Assistant Attorney General, Designated Counsel for CPRA
Patricia Brister, President, St. Tammany Parish
John Smith, Department of Engineering, St. Tammany Parish

**EXHIBIT 2**

Self-Certification of Financial Capability

**NON-FEDERAL SPONSOR'S**
**SELF -CERTIFICATION OF FINANCIAL CAPABILITY**
**FOR DECISION DOCUMENTS**
**FOR THE SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT (SELA),**
**W-14 CANAL IMPROVEMENTS PROJECT,**
**ST. TAMMANY PARISH, LOUISIANA**

I, Garret Graves, do hereby certify that I am the Chairman of the Coastal Protection and Restoration Authority of Louisiana (the "Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT (SELA), W-14 CANAL IMPROVEMENTS PROJECT; and that the Non-Federal Sponsor will have the financial capability to satisfy the Non-Federal Sponsor's obligations for the SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT (SELA), W-14 CANAL IMPROVEMENTS PROJECT. I understand that the Government's acceptance of this self-certification shall not be construed as obligating either the Government or the Non-Federal Sponsor to implement a project.

IN WITNESS WHEREOF, I have made and executed this certification this 22nd day of May, 2012.

BY: _____

TITLE: CPRA Chairman

DATE: May 22, 2012

**EXHIBIT 3**

Agency Technical Review Certification

## STATEMENT OF TECHNICAL REVIEW FOR DECSION 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 DrChecks[sm].

Karen V. Miller — 3/16/12

*Karen Miller*
Agency Technical Review Team Lead
*CELRH-PD-F*
Date

Donna M. Urban — 3/23/12

*Donna Urban*
CEMVN Project Manager
Date

**EXHIBIT 4**

Certification of Legal Sufficiency

CERTIFICATE OF
LEGAL REVIEW

FOR

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

The Southeast Louisiana Urban Flood Control Project, W-14 Canal Improvements, Section 533(d) Report, including all associated documents required by the National Environmental Policy Act, has been fully reviewed by the Office of Counsel, New Orleans District and is approved as legally sufficient.

Denise D. Frederick June 27 2012

DENISE D. FREDERICK DATE
District Counsel
CEMVN-OC

# PLATES

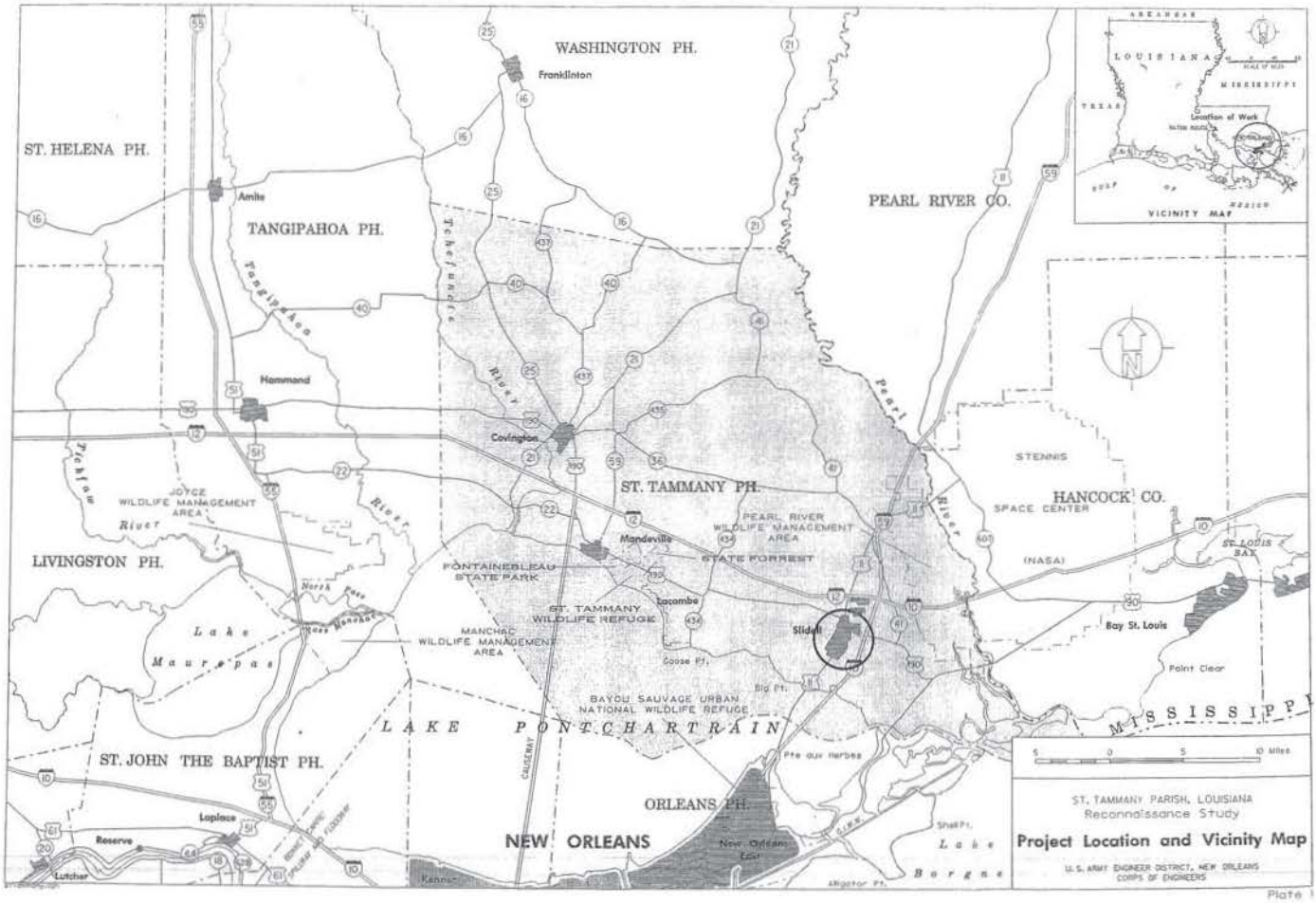

WASHINGTON PH.
Franklinton
ST. HELENA PH.
Amite
TANGIPAHOA PH.
PEARL RIVER CO.
Tangipahoa River
Tchefuncte River
Hammond
Covington
Pearl River
ST. TAMMANY PH.
STENNIS
SPACE CENTER
HANCOCK CO.
JOYCE WILDLIFE MANAGEMENT AREA
Tchefuncte River
Mandeville
PEARL RIVER WILDLIFE MANAGEMENT AREA
STATE FORREST
LIVINGSTON PH.
FONTAINEBLEAU STATE PARK
(NASA)
ST. LOUIS BAY
North Fork
Lake Maurepas
ST. TAMMANY WILDLIFE REFUGE
Lacombe
Slidell
Bay St. Louis
MANCHAC WILDLIFE MANAGEMENT AREA
Goose Pt.
Point Clear
BAYOU SAUVAGE URBAN NATIONAL WILDLIFE REFUGE
Big Pt.
MISSISSIPPI
LAKE PONTCHARTRAIN
ST. JOHN THE BAPTIST PH.
CAUSEWAY
Pte aux Herbes
ORLEANS PH.
Lapalace
Reserve
NEW ORLEANS
New Orleans East
Shell Pt.
Lake Borgne
Lutcher
Kenner
Alligator Pt.
LOUISIANA
TEXAS
Location of Work
VICINITY MAP
5 0 5 10 Miles
ST. TAMMANY PARISH, LOUISIANA
Reconnaissance Study
Project Location and Vicinity Map
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
CORPS OF ENGINEERS

Plate 1

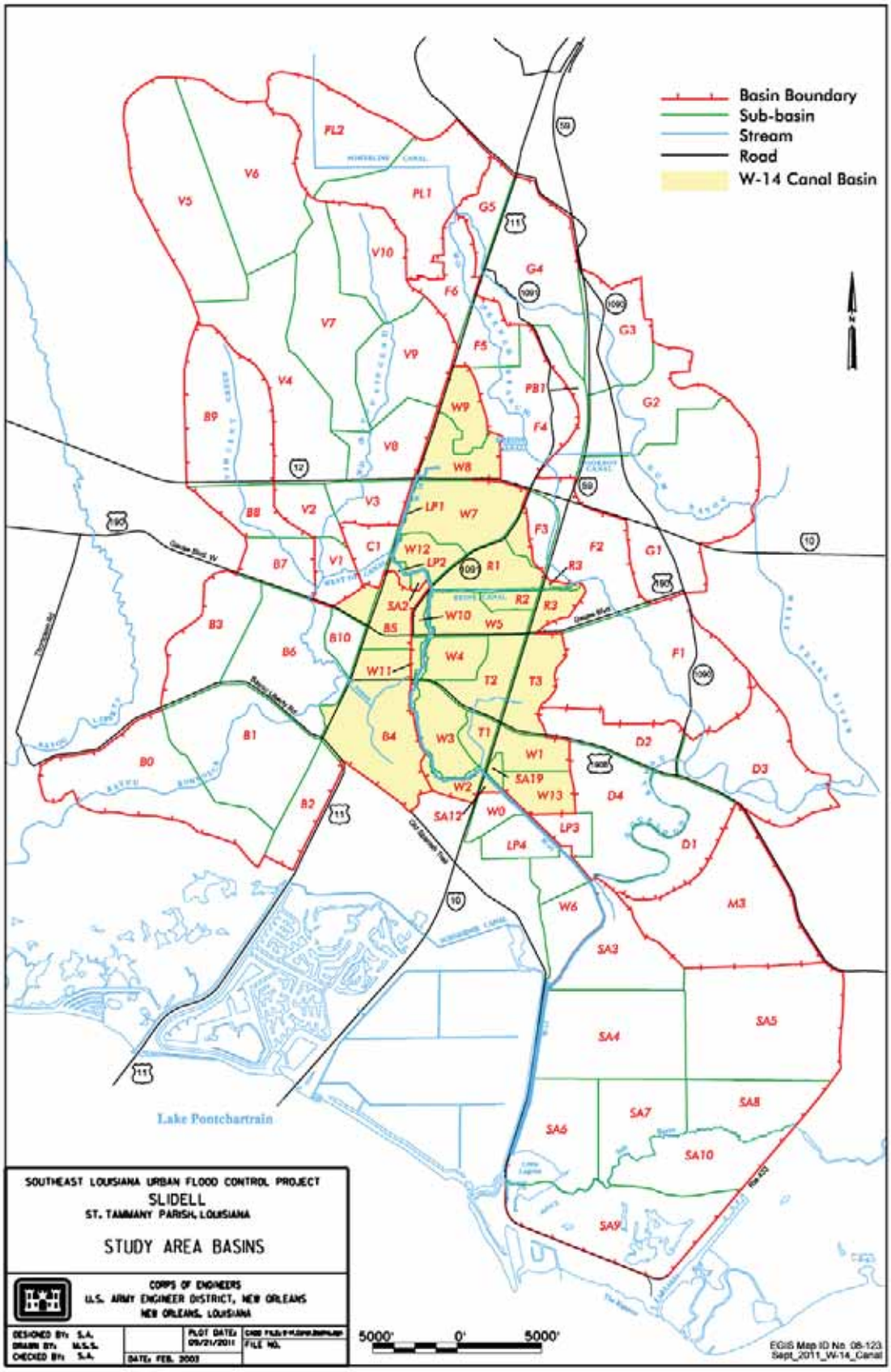
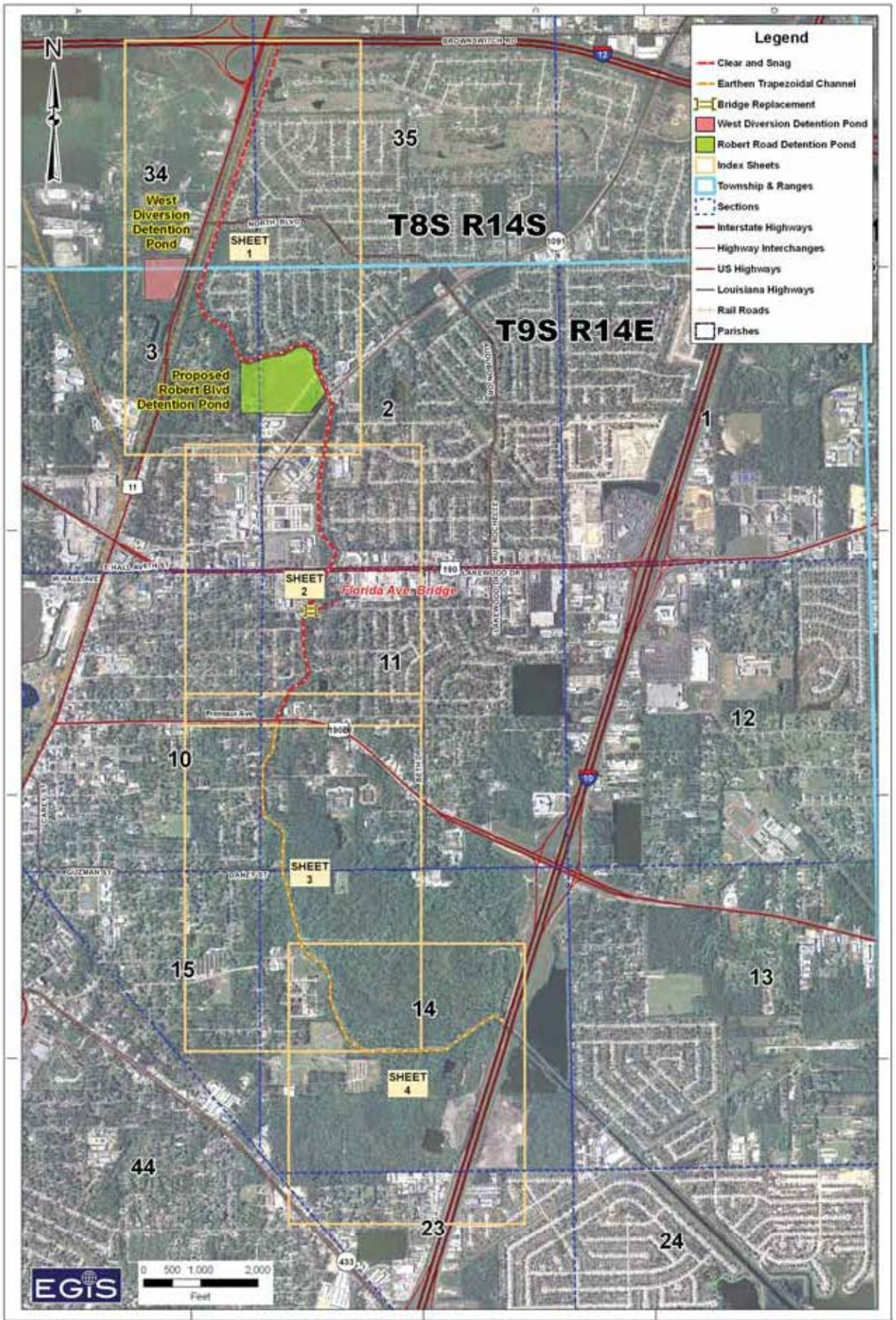

Basin Boundary
Sub-basin
Stream
Road
W-14 Canal Basin
Lake Pontchartrain
SOUTHEAST LOUISIANA URBAN FLOOD CONTROL PROJECT
SLIDELL
ST. TAMMANY PARISH, LOUISIANA
STUDY AREA BASINS
CORPS OF ENGINEERS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS
NEW ORLEANS, LOUISIANA
DESIGNED BY: S.A.
DRAWN BY: M.S.S.
CHECKED BY: S.A.
PLOT DATE: 09/21/2011
DATE: FEB. 2003
FILE NO.
5000' 0' 5000'
EGIS Map ID No. 08-123
Sept_2011_W-14_Canal

PLATE 2




SELA, St. Tammany Parish
W-14 Canal Improvements
Slidell, Louisiana

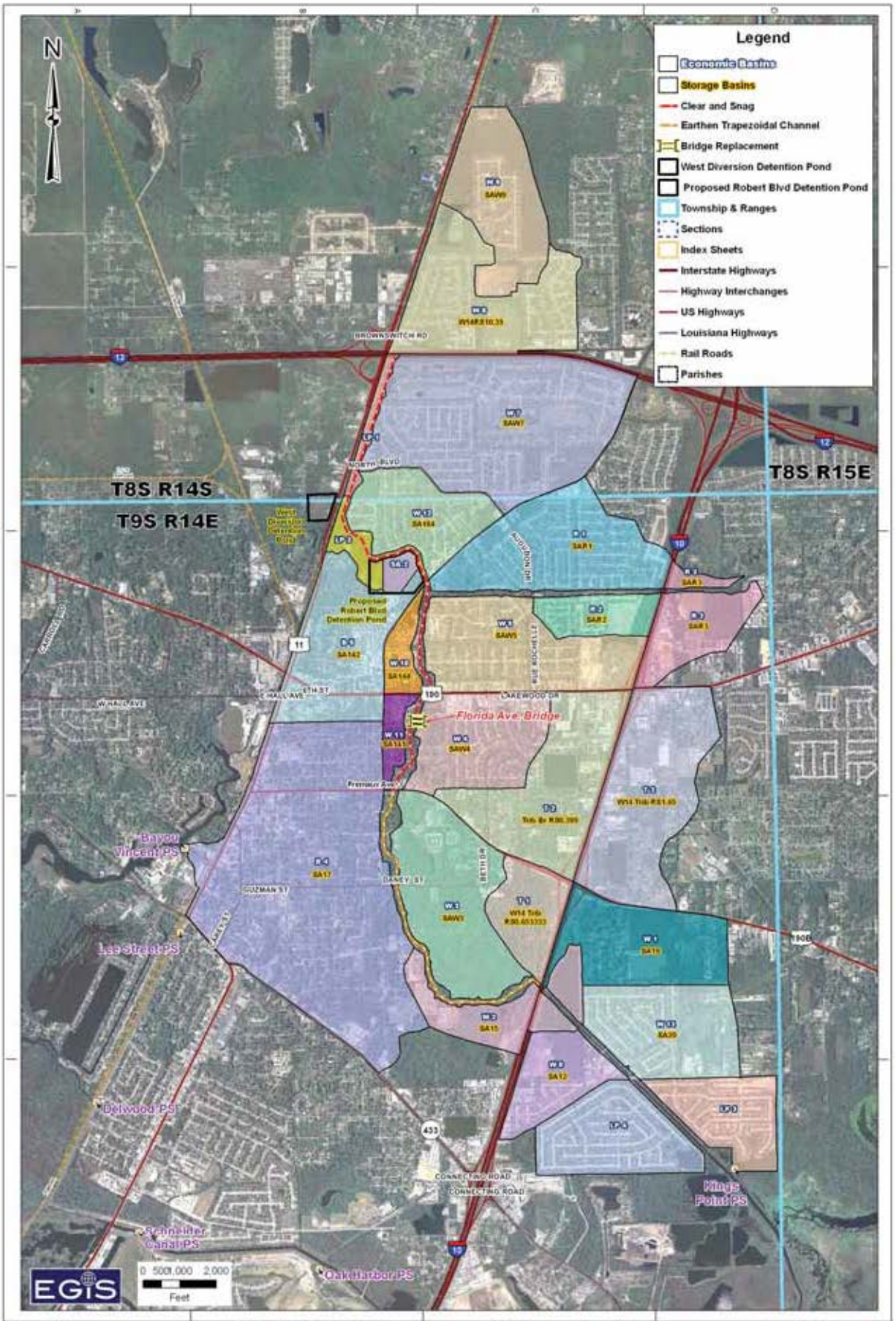
SHEET IDENTIFICATION NUMBER
DWG 1 OF 5

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

November 2011

Job No. EGIS-08-123

PLATE 3




SELA, St. Tammany Parish
W-14 Canal Improvements
Slidell, Louisiana

SHEET IDENTIFICATION NUMBER
DWG 1 OF 5

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
MISSISSIPPI VALLEY DIVISION

November 2011

Job No. EGIS-08-123

PLATE 4

# SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT

# SOUTHEAST LOUISIANA (SELA)
# URBAN FLOOD CONTROL PROJECT

# W-14 DRAINAGE CANAL, SLIDELL AREA

# ST. TAMMANY PARISH, LOUISIANA

# SEA # 409A

## INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Mississippi Valley Division, New Orleans District (CEMVN), has prepared this Supplemental Environmental Assessment # 409A (SEA # 409A) 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. 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 (Figure 1).

The W-14 Canal project was originally studied in Environmental Assessment (EA) #409. During the final technical review of the DRAFT W-14 Canal Improvements Section 533(d) report (May 2010), an anomaly in EA #409's economic analysis was discovered. The project was showing exaggerated project benefits associated with preventing damages from the 1- and 2-year rainfall events. Although initial refinements to the modeling corrected the anomalous results, further economic analysis showed a significant reduction in the anticipated benefit-cost ratio (BCR), thereby threatening the project's viability. The project appeared to include many high cost features that provided low benefits. These results indicated that MVN did not have a project with federal interest. Reformulation of the W-14 Canal Project was necessary. SEA #409A addresses the reformulated project.

SEA #409A has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's Regulations (40 CFR §1500-1508), as reflected in the USACE Engineering Regulation, ER 200-2-2. The following sections include a discussion of the purpose and need for the proposed action, the authority for the proposed action, alternatives to the proposed action, important resources affected by the proposed action, and the environmental consequences of the proposed action.

## PURPOSE AND NEED FOR THE PROPOSED ACTION

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 29 August 2005, Hurricane Katrina caused major damage to the Federal and non-Federal flood control infrastructure and the Hurricane and Storm Damage Risk Reduction System (HSDRRS) in southeast Louisiana. Since then, 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.


**Figure 1. Slidell, Louisiana and vicinity**

## AUTHORITY FOR THE PROPOSED ACTION

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 104-33, Section 533. These statutory provisions direct the Secretary to 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. Sec. 533 of WRDA 1996

requires the planning and construction of flood control facilities in St. Tammany Parish to follow the New Orleans District Engineers' 1996 report on St. Tammany Parish.

## PRIOR REPORTS

CEMVN's July 1996 report, entitled "St. Tammany Parish, Louisiana, Reconnaissance Study," presented the findings of a reconnaissance-level investigation of rainfall flooding associated with storm water runoff and high tides in St. Tammany Parish, Louisiana. The study investigated possible solutions to prevent flooding in St. Tammany Parish, including diversion of floodwaters, retention/detention basins, channel enlargement, removal of channel obstructions, flood control structures, and other non-structural measures such as raising houses. The 1996 Reconnaissance Study is herein incorporated by reference.

In July 2009, Environmental Assessment (EA) #409, Southeast Louisiana (SELA) Urban Flood Control Project, W-14 Drainage Canal, Slidell Area, St. Tammany Parish, Louisiana, was prepared to assess environmental impacts associated with construction of the flood control features recommended in the 1996 Reconnaissance Study: widening and lowering approximately 4.1 miles of the existing W-14 Canal to improve flood flow capacity, excavating 4 new detention ponds with overflow weirs, expanding an existing pond, installing culverts, replacing 3 existing bridges, and constructing a new pump station. However, the project described in EA #409 was not constructed due to lower than expected benefit to cost ratios. EA #409 is herein incorporated by reference.

## PUBLIC CONCERNS

The risk of floodwater damage caused by the lack of existing drainage capacity is a great concern to the public in St. Tammany Parish, Louisiana. Hurricanes Katrina forced most St. Tammany Parish residents from their homes and hurricane-related flooding caused severe and widespread property damage

Conversely, some residents have expressed concerns about potential impacts to wetlands and aquatic ecosystems that may be caused by project construction, as well as noise impacts to nearby neighborhoods.

## DESCRIPTION OF THE PROPOSED ACTION

The project includes work along approximately 4.4 miles of the existing W-14 Canal that consists of clearing and snagging approximately 2.7 miles of the existing canal, widening an approximately 0.5 mile stretch of the existing canal and lowering its existing invert elevation to improve flood flow capacity, incorporating approximately 1.2 miles of the W-14 Canal that was previously widened in 2010, incorporating a detention pond that was previously constructed in September 1998, expanding and improving an existing detention pond, constructing overflow weirs, installing culverts, and replacing (relocating) an existing bridge (see Figure 2). These features of work are of types designed and constructed by the New Orleans District in the past. The designs were prepared on the basis of detailed surveys and soil borings. The structural components shall be designed in accordance with the applicable portions of the Corps of Engineers manuals for engineering and design. A detailed description of each project feature follows:

Canals

- *Interstate 12 to Fremaux Avenue.* Improvements to the existing W-14 canal will include clearing and snagging along approximately 14,000 feet of channel to remove vegetation, trees, and debris that may impede water flow.

- *Fremaux Avenue to Daney Street.* Improvements to the W-14 canal will include clearing and snagging along approximately 2,900 feet of channel to remove vegetation, trees, and debris that could impede water flow, reshaping this reach of the canal to a trapezoidal earthen channel having a 10-foot bottom width with 3H:1V side slopes from the downstream side of Fremaux Avenue to the upstream side of the Daney Street Bridge.

- *Daney Street to Interstate 10.* St. Tammany Parish constructed improvements to this portion of the W-14 Canal in 2010. The work consisted of clearing and snagging of the existing canal to remove vegetation, trees, and debris that could impede water flow. The improvements also included reshaping this reach of the canal along approximately 6,500 feet to a trapezoidal section having a 40-foot 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. While clearing, snagging, and reshaping of the Daney Street to Interstate 10 reach of the W-14 project has been completed, the activity is analyzed in this Supplemental Environmental Assessment to inform the public of actual and anticpated environmental effects and to invite comment.

Detention Ponds

- *Robert Boulevard Detention Pond and Weir.* Improvements to an existing detention pond and construction of weirs just north of Robert Boulevard will include deepening the bottom of the pond to elevation +1.5 feet NGVD and expanding the surface area by 11.7 acres from 19.6 to 31.3 acres. The pond will have three lateral broad-crested weirs constructed to connect the W-14 Canal to the pond. The pond will be drained by two 24-inch reinforced concrete pipes that are 25 feet in length with an invert at +1.5 feet NGVD.

- *West Diversion Detention Pond.* The West Diversion Detention Pond was constructed in 1998 by the City of Slidell. It is located on the west side of U.S. Highway 11 near North Boulevard and is incorporated as a feature of the W-14 Canal project for flood risk reduction. The work consisted of clearing and excavation of a parcel of land (approximately 14 acres) to construct a storm water detention pond, construction of an embankment berm, construction of an aggregate access road, removal of excess spoil material, perimeter fencing, and seeding and fertilizing. The pond bottom elevation is +7 feet National Geodetic Vertical Datum (NGVD) with a channel at elevation +4.25 feet NGVD. The West Diversion Detention Pond, while already constructed, is included in the W14 project and analyzed in this Supplemental Environmental Assessment to inform the public of actual and anticipated environmental effects and to invite comment.

Bridge Relocation

- Replacement of the existing Florida Avenue Bridge will include the removal of the existing bridge and installation of a new 45-foot clearspan bridge.

Overall Project

Detailed planning and design specifications are scheduled to begin in mid-2012. Construction is estimated to begin in fiscal year 2014 with an estimated duration of three years. Six construction contracts would be awarded for the project. The proposed construction equipment staging areas include the West Diversion Detention Pond, the Robert Road Detention Pond, the construction right of way at Florida Street and the W-14 Canal, and the Daney Street construction right of way along the east bank of the W-14 Canal north of the Daney Street Bridge. None of these staging areas would be located in jurisdictional wetlands. Traffic along streets affected by construction would likely be reduced to one lane, with only private home access, or completely closed to traffic. Normal traffic on the affected streets would be detoured to adjacent streets during the construction period. All street closures and detours would be coordinated with the City of Slidell, Department of Public Works, to ensure city services and public safety are maintained at all times.

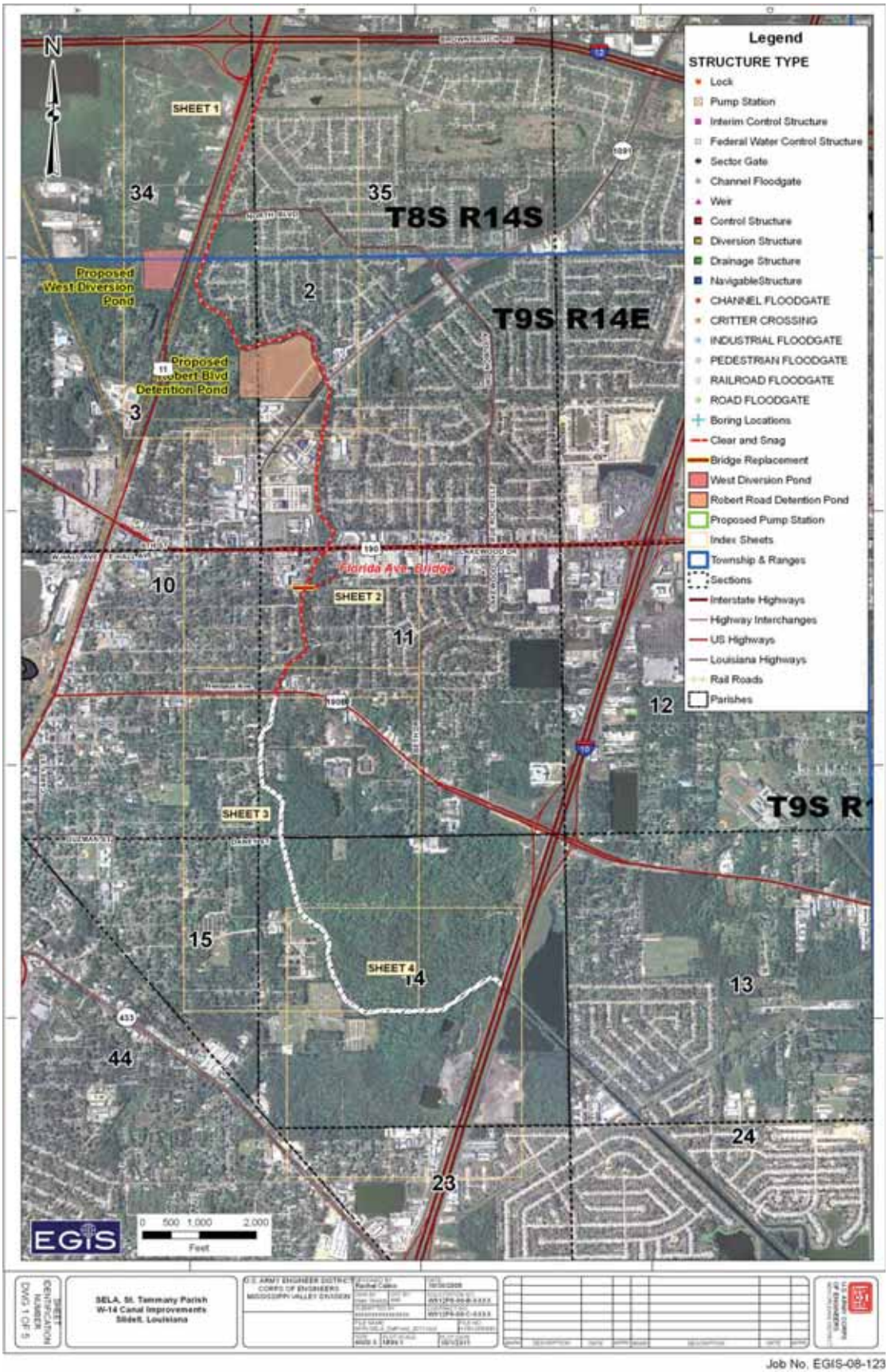



**Figure 2. W-14 canal in Slidell, Louisiana**

**Figure 3. Looking south along W-14 Canal**

**Figure 4. Type of debris that will be cleared from the W-14 Canal**

**Figure 5. Type of debris to be removed from the W-14 Canal**

**Figure 6. W-14 Canal with herbaceous growth along the banks**

**Figure 7. Photo of the W-14 Canal, looking north from the Daney Street Bridge**

**Figure 8. Photo of the W-14 Canal, looking south from the Daney Street Bridge. This section of W-14 Canal**

**previously widened and improved by contractor.**

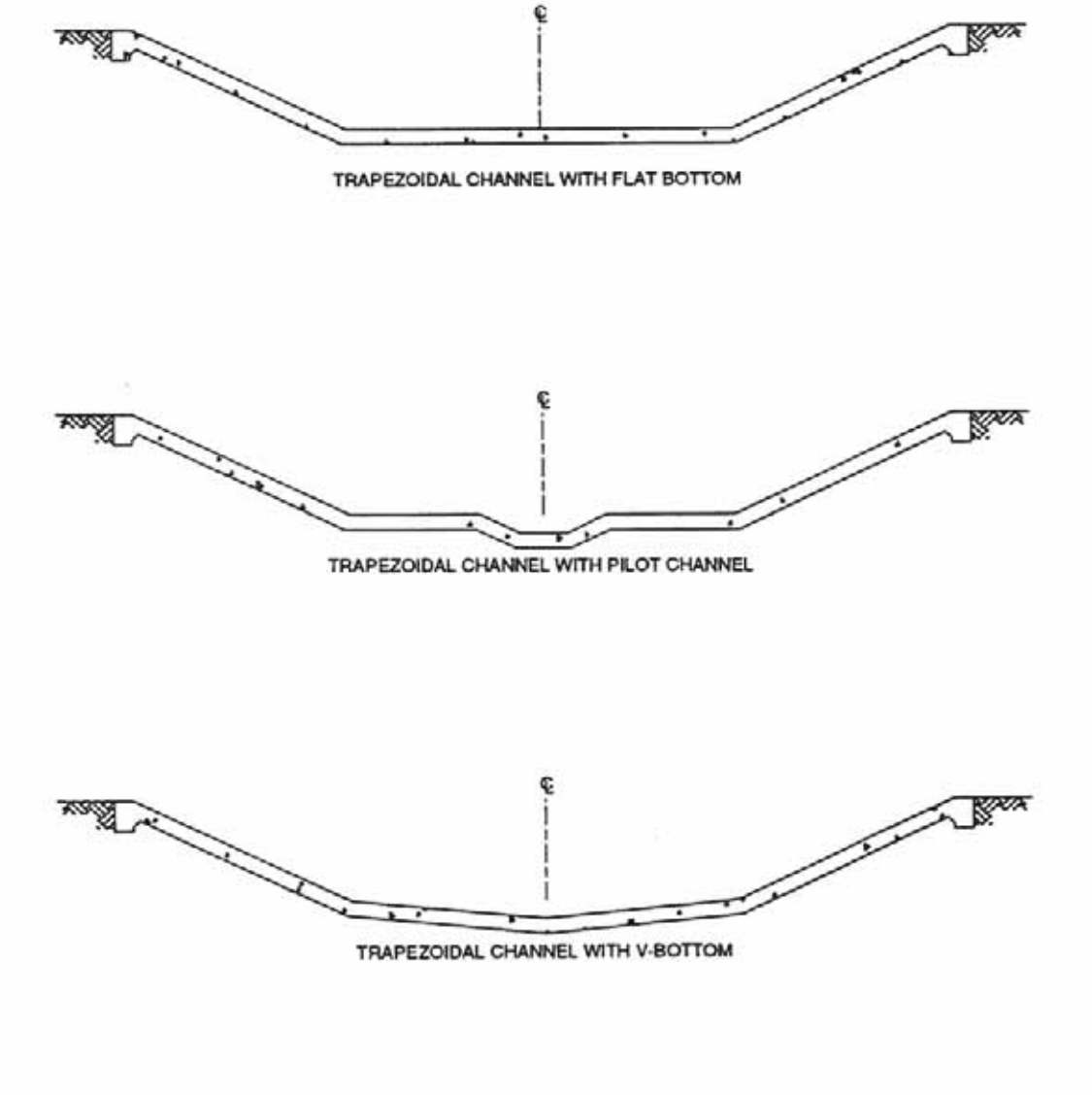



**Figure 9. Typical trapezoidal channel profiles**

## DATA GAPS AND UNCERTAINTIES

The analysis presented in SEA # 409A has been performed prior to adoption of a final project plan and is based on concept level design and reasonable assumptions regarding the proposed actions. While the alternatives described in this evaluation are preliminary, the basic

function of their features and the footprint for their construction is known should remain substantially the same as the project progresses through actual design. Comprehensive project costs have not yet been determined.

The estimated environmental impacts have been developed to provide the decision maker with a description of the anticipated project effects, while leaving room for refinements of design without compromising the integrity of this assessment. As such, the following description of project features does not imply a formal commitment to final design, selection of equipment, or methods of construction, but analyzes likely environmental impacts of the probable project plan.

## ALTERNATIVES TO THE PROPOSED ACTION

NEPA requires that in analyzing alternatives to the proposed action, a Federal agency consider an alternative of "no action." Likewise, Section 73 of the Water Resources Development Act of 1974 (PL 93-251) requires Federal agencies to give consideration to non-structural measures, such as structure raising to reduce or prevent flood damage, or buy-outs to reduce the number of at-risk property owners.

Structure Raising Alternative: The economic feasibility of this option within a risk-based framework was analyzed. It took the form of structure raising for all residential structures within the project-area's 100-year floodplain. This analysis assumes raising these residential buildings above the elevation of the stages associated with a 100-year storm event. The benefits associated with this option were defined as the reduction in damages that would otherwise occur from flooding caused by various storm intensities, up to a 100-year storm. For this analysis, critical variables were quantified (stage-frequency relationships, water depth-property damage relationships, structure and content values, and first floor elevations) through the development of probability distributions. 588 residential buildings eligible to be raised were identified through this analysis. The total first costs of raising these residential buildings were estimated to be $74,731,000, or an average annual cost of $3,479,000 over the project's 50-year life. The expected annual benefits of residential building raising were estimated to be $5,023,000, leaving a net annual benefit of $1,544,000 and a benefit-cost ratio of 1.44. These results assume 100 percent participation on the part of property owners whose properties are below the 100-year storm event elevation within the project area, and assume completion of the building-raising program within a period of one year. These assumptions are subject to revision based upon additional field research, which may cause the BC ratio for the structure-raising alternative to drop significantly.

While the cost-benefit ratio of the structure-raising alternative appears to be greater than the cost-benefit ratio of the proposed plan, practical considerations make the structure-raising alternative unfeasible. First, the practical difficulties presented by the challenge of raising 588 private residences are overwhelming: highly complex construction logistics, the hardship of finding scores of qualified contractors, legal obstacles presented by recalcitrant homeowners, possible opposition by the City, potential vandalism and crime in empty neighborhoods, unanticipated but likely cost overruns, and this option's complete absence of flood protection for commercial structures. Second, even at the projected cost of $74,700,000, the structure-raising alternative is more than three times the projected cost of the proposed plan. In the present climate of Congressional austerity, approval for the structure-raising alternative is judged to be

far less likely than approval of the more frugal proposed plan; moreover, the structure-raising alternative would impose a significantly larger financial burden on the non-federal sponsor.

No Action Alternative: Under the no action alternative, the proposed improvements would not be constructed by the CEMVN**.** the existing W-14 Canal would require routine maintenance operations, and the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin in the city of Slidell, LA would remain at its present elevated level.

## ENVIRONMENTAL SETTING

### GENERAL

The study area is located in southeast Louisiana and covers the W-14 Canal drainage basin within the City of Slidell. The project area is adjacent to the W-14 Canal, north of Lake Pontchartrain, south of Interstate Highway 12, east of U.S. Highway 11, and west of Interstate Highway 10. The study area consists primarily of high-density residential and commercial neighborhoods, although a few stands of mixed pine/bottomland hardwoods remain adjacent to the W-14 Canal.. Portions of these forested areas contain wetland vegetation. The W-14 Canal drainage basin drains most of the incorporated area of Slidell as well as a small area north of the city limits. The canal extends approximately 20,000 feet in length and intersects bridges at the following streets: North Boulevard, Robert Road, Independence Drive, Gause Boulevard, Florida Avenue, U.S. Highway 190 (aka Fremaux Avenue or Shortcut Highway), Cousin Street, and Daney Street. The W-14 Canal is hydrologically connected to Lake Pontchartrain. Storm water runoff from the study area flows into the W-14 Canal via natural gravity drainage, and drains southeasterly into the Fritchie Marsh, along the northeast shore of Lake Pontchartrain. Wildlife populations are moderate within the canal's banks, including various resident and migratory avian species, songbirds, game birds, raptors, reptiles, amphibians, small game mammals, small rodents, and other mammals. The canal also provides habitat and feeding areas for certain aquatic species.

The W-14 canal was built in the 1940s by the Louisiana Office of Public Works (now part of the Louisiana Department of Transportation and Development). The lower portion of the W-14 Canal was enlarged to a 60-foot bottom width canal in the mid-1970s. The upper reach, where most of the local flooding occurs, has never been enlarged, while nearby residential and commercial development has increased exponentially since the canal was originally excavated. The area surrounding the W-14 Canal currently bears little resemblance to its original conditions.

### CLIMATE

The climate of the area is humid subtropical, with short, generally mild winters and hot, humid summers. Precipitation in winter usually accompanies the passing of a cold front. Prevailing southerly winds create a strong maritime character. This movement from the Gulf of Mexico helps decrease the range between hot and cold temperatures and provides a source of abundant moisture and rainfall.

Temperature

Table 1 shows monthly and annual average normal temperatures recorded at the Slidell Weather Station, the most proximate weather station to the project area. The annual mean normal temperature is 67.5°F, with monthly mean temperature normal varying from 82.1°F in July to 50.7°F in January.

**Table 1. Mean Monthly and Annual Temperature (°F)**

| Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slidell | 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 |

Precipitation

Records of precipitation taken at the Slidell Weather Station were used to show the rainfall data for the study area. The Slidell Weather Station is operated by the National Weather Service and has records from 1971-2000. Table 2 contains the average monthly and annual precipitation at this station for the period 1971-2000. The Station recorded an average annual rainfall of 62.66 inches, with July being the wettest month with an average of 6.55 inches. October is the driest month, averaging 3.10 inches. The maximum monthly rainfall occurred in May 1995 with measurements of 25.93 inches.

**Table 2. Average Precipitation (inches)**

| Station | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Slidell | 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 |

## GEOLOGY

Within the vicinity of the W-14 Canal, most soil types are classified as Myatt-Stough-Prentiss complex (USDA SCS 1990). These soils are described as loamy, level and very gently sloping, poorly drained to moderately well-drained soils. The Myatt series soils have a dark gray fine sandy loam surface layer, which is approximately 4 inches thick. The subsurface layer contains a gray, mottled fine sandy loam, which extends to a depth of 12 inches. The subsoil is a gray, mottled loam and extends to a depth of 50 inches. The underlying material is a light brownish gray, mottled clay loam and extends to a depth of 64 inches. In addition, Myatt series soils are described as well suited for supporting wetland plant habitats.

The Stough series consists of coarse-loamy soils, which are moderately poorly drained and moderately slowly permeable. They are formed in loamy marine and fluvial sediments. Stough soils have moderate potential for supporting wetland plant habitats. The Prentiss series are coarse-loamy soils that are moderately well-drained and form in loamy marine and fluvial sediments. Prentiss soils are poorly suited for supporting wetland plant habitats.

## RELEVANT RESOURCES

This section identifies the relevant resources present in the project area, and describes in detail those resources that could be impacted, directly or indirectly, by the project alternatives.

Direct impacts are those impacts that are caused by the action taken and occur at the same time and place (40 CFR §1508.8(a)). Indirect impacts are those impacts that are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable (40 CFR §1508.8(b)). Cumulative impacts include past, present, or future project impacts on the environment.

The resources described in this section are those recognized as important by laws, executive orders, regulations, and other standards of National, state, or regional agencies and organizations, technical or scientific agencies, groups, or individuals, and the general public.

The relevant resources described in this section include: air quality, water quality, aquatic resources, wetlands, pine/mixed bottomland hardwood forest, wildlife, threatened or endangered species, socioeconomics, cultural resources, recreational resources, aesthetic (visual) resources, and hazardous, toxic, and radioactive waste.

The following resources have been considered and found to not be affected by the alternative under consideration: essential fish habitat, prime and unique farmland, terrestrial resources, and estuarine water bodies.

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.

## AIR QUALITY

Existing Conditions

This resource is considered institutionally important because of the Louisiana Environmental Quality Act of 1983, as amended, and the Clean Air Act of 1963, as amended. Air quality is technically important because of the status of regional ambient air quality in relation to the National Ambient Air Quality Standards (NAAQS). It is publicly important because of the desire for clean air expressed by virtually all citizens.

The U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, sets NAAQS for six principal pollutants, called “criteria” pollutants. They are carbon monoxide, nitrogen dioxide, ozone, lead, particulates of 10 microns or less in size (Particulate Matter (PM)-10 and PM-2.5), and sulfur dioxide. Ozone, the only parameter not directly emitted into the air, forms in the atmosphere when three atoms of oxygen ($O_3$) are combined by a chemical reaction between oxides of nitrogen ($NO_x$) and volatile organic compounds (VOC) in the presence of sunlight. Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents are some of the major sources of $NO_x$ and VOC, also known as ozone precursors. Strong sunlight and hot weather can cause ground-level ozone to form in harmful concentrations in the air.

For St. Tammany Parish, all six parameters are currently in attainment of all NAAQS in accordance with 40 CFR 81.320 (1999 edition). Because the project area is designated as an attainment area, no conformity review (under the Clean Air Act General Conformity Rule) would be required for the proposed action. The proposed area largely consists of residential and

commercial neighborhoods.

Future Conditions with No Action

If the proposed action is not undertaken, potential air quality impacts associated with the construction and operation of new storm damage reduction measures would not occur. Periodic flooding can lead to temporary deterioration in air quality when contaminants in flood waters volatize. In addition, sediment clean up can lead to temporary increases in fugitive dust from street sweeping, including dried sewage. Also, transportation of debris and rubble from the cleanup of storm damages contributes to local emissions and decreases air quality.

Future Conditions with the Proposed Action

Sources of project-related direct emissions would include construction activities of equipment used to facilitate the action (e.g., construction vehicles). Sources of indirect emissions include commuter activity to and from the construction site (e.g., employee vehicle emissions). Both stationary and mobile sources must be included when calculating the total of direct and indirect emissions, but this project would involve only mobile sources.

No detailed conformity assessment would be required because St. Tammany Parish is designated as an attainment area for the designated priority pollutants. The total volatile organic compound emissions for this project during construction is anticipated to be well below the *de minimus* level of 100 tons per year. Therefore, this action conforms to the Louisiana State Implementation Plan and no direct significant adverse impact to air quality is anticipated if the proposed action is undertaken.

## WATER QUALITY

Existing Conditions

Present water quality problems in the W-14 canal are most likely due to runoff of urban waste such as oil, grease, and trash, or occasional sanitary wastewater contamination of the drainage system. During periods of flooding, raw or partially treated wastewater may combine with stormwater runoff as the result of bypasses and overflows and infiltration and inflow from the sanitary wastewater conveyance system into the storm water conveyance system, causing significant contamination. Stormwater runoff also contributes urban pollution to the canal system.

Any pathogenic bacteria in the water of the W-14 Canal could be exposed to humans during major flooding or storm events. Organisms that are discharged from the intestinal tracts of humans or animals in fecal material may be harmful to humans. The most commonly employed pathogenic indicators are the coliform group of bacteria.

Biological Oxygen Demand (BOD) is an indicator of biodegradable organic material related to wastewater as well as synthesized organic materials. Biodegradable materials deplete oxygen in the water column as they decay. This can be detrimental to aquatic species and can cause

undesirable anaerobic conditions. No known testing has been performed to analyze BOD in the W-14.

Future Conditions with No Action

If the proposed project is not constructed, routine maintenance of the existing canal could release undesirable materials such as grass clippings and brush and tree trimmings into the surface water. The effects of these releases would be temporary and localized in the immediate work area.

Future Conditions with the Proposed Action

Clearing, snagging, and re-grading the canal would likely cause some temporary, construction-related direct effects to water quality. With best management practices in place during construction, the temporary effects to water quality should be confined to isolated localized events. These localized effects to water quality would include an increase in turbidity and suspended sediments, a mobilization of nutrients and detritus from the bottom, leading to a localized reduction in dissolved oxygen, and a potential for the mobilization of contaminants sequestered in bottom sediments. No permanent decrease in water quality is anticipated.

Earth-moving activities during construction disturb soils and can create indirect water quality effects in the event of uncontrolled runoff or poor sediment control practices during construction. Minor cumulative effects would be expected, as there would be no significant decreases in water quality with the implementation of the proposed action.

A Water Quality Certification (WQC 081015-04/AI 161334/CER 20110001) dated 1 November 2011, was received from the Louisiana Department of Environmental Quality.

**AQUATIC RESOURCES**

Existing Conditions

This resource is institutionally important because of the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended, and the Fish and Wildlife Coordination Act of 1958, as amended. Aquatic resources are technically important because they are a critical element of many valuable freshwater and marine habitats, they are an indicator of the health of various freshwater and marine habitats, and many aquatic species are important recreational and commercial resources. Aquatic resources are publicly important because of the high priority that the public places on their aesthetic, recreational, and commercial value.

The W-14 Canal does not support important aquatic resources due to artificial drainage, dense vegetation, poor water quality, and inadequate water depths. Runoff from nearby developed areas has reduced the Canal's aquatic habitat value by introducing various urban pollutants (e.g., oil, grease, fertilizers, pesticides, etc.). However, some freshwater fish species such as bowfin, spotted gar, and mosquito fish may be found in the canal. Invertebrates, such as crawfish, and grass shrimp may inhabit portions of the canal. Aquatic species that survive are those able to tolerate low dissolved oxygen levels and various contaminant levels.

Future Conditions with No Action

If the proposed action is not undertaken, aquatic resources within the W-14 Canal would remain in their present state. Due to the high ephemeral flows and continuous introduction of urban runoff, the value of these aquatic resources would remain low. Inflows of oil and grease, fertilizers and pesticides and other urban waste materials will continue to contaminate the W-14 aquatic environment, as well as periodic urban runoff from storm sewers and septic tanks.

Future Conditions with the Proposed Action

The excavation of approximately 7,700 cubic yards of earthen material to construct the improved W-14 Canal from Fremaux Avenue to Daney Street would remove approximately 1.9 acres of aquatic habitat from within the W-14 Canal.

Direct effects to aquatic resources from construction -- increased local turbidity, decreased dissolved oxygen, and subsurface noise -- would be of only temporary duration and are not considered significant.

Construction / enlargement of the project's two detention ponds, adding approximately 25.7 acres of ponding area, would not lead to a significant expansion of aquatic resources within the project area because these "ponds" are designed to remain dry until needed as catch basins for stormwater run-off. The detention ponds would accumulate storm water during major rain events, but would discharge back into the W-14 Canal after water levels in the canal diminished, leaving the detention pond areas dry.

The proposed action would not have a significant cumulative effect on regional aquatic habitat because the project would permanently remove only 1.9 acres of impaired aquatic resources, a de minimis loss in the context of the project area's approximately 18 acres of aquatic habitat.

**WETLANDS**

Existing Conditions

This resource is institutionally important because of the Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968, Executive Order 11988, and Fish and Wildlife Coordination Act. Wetlands are technically important because they provide necessary habitat for various species of plants, fish, and wildlife, they serve as ground water recharge areas, they provide storage areas for storm and flood waters, they serve as natural water filtration areas, they provide protection from wave action, erosion, and storm damage, and they provide various consumptive and nonconsumptive recreational opportunities. Wetlands are publicly important because of the high value the public places on their functions and values.

Wetlands provide valuable habitat for an abundance of wildlife species. The marsh and forested wetlands provide feeding, resting, nesting, hunting, and escape habitat to numerous species of game and non-game mammals and recreationally and commercially important furbearers, as well as songbirds, raptors, migratory and resident waterfowl, wading birds, woodpeckers, and many species of amphibians and reptiles.

The vegetation within the general project area is classified as moderate to low quality mixed pine/bottomland hardwoods, with some saturated areas that support wetland plants. Wetland vegetation can be found within the proposed Robert Road Detention Pond enlargement area. Approximately 1.1 acres of mixed pine/bottomland hardwood wetlands within this pond would be removed by the proposed action. The vegetation found on the upper reaches of the W-14 Canal banks is of less ecological value since these areas have undergone severe alteration by residential and commercial development and are regularly maintained by mowing.

Future Conditions with No Action

If the proposed action is not undertaken, the functions and values of existing wetlands within the project area would continue to be influenced by periodic flooding and rainfall events. Routine maintenance of the existing W-14 Canal would have no effect on wetlands because these actions take place within previously disturbed areas. Thus the "no action" alternative would cause no direct wetland impacts.

Future Conditions with the Proposed Action

Approximately 6.3 acres of wetland vegetation presently exists in the forested buffer along the W-14 Canal and pond locations. The project's mechanical clearing and snagging operations would cause the loss of approximately 1.1 acres of these wetlands.

Some wetland species would naturally re-vegetate in shallow and saturated areas within the Robert Road pond and on the W-14 Canal side slopes after construction activities are completed.

## MIXED PINE/BOTTOMLAND HARDWOOD FOREST

Existing Conditions

The national importance of this resource is recognized in Section 906 of the Water Resources Development Act of 1986 and the Fish and Wildlife Coordination Act of 1958, as amended. Mixed pine/bottomland hardwood forests are technically important because they provide necessary habitat for a variety of species of plants, fish, and wildlife. They provide a variety of wetland functions and values, are an important source of lumber and other commercial forest products, and they provide various consumptive and non-consumptive recreational opportunities, such as hunting, camping, hiking, photography, bird watching, etc. Mixed pine/bottomland hardwood forests are publicly important because of the high priority the public places on their aesthetic, recreational, and commercial values.

Historically, the non-aquatic habitat within the project footprint would be classified as pine savannah. Approximately 80 percent of the vegetation found within the project area is slash pine. The remaining 20 percent is comprised of species such as loblolly pine, several species of oak, southern magnolia, sweetbay magnolia, Drummond red maple, sweet gum, black gum, American sycamore, Chinese tallow, and persimmon. The average diameter at breast height of these species ranges from 6 inches to16 inches. Understory species found within the project area

include poison ivy, fern, muscadine, wax myrtle, Chinese privet, pepper vine, honey suckle, yaupon, smilax, and elderberry.

Future Conditions with No Action

If the proposed action is not undertaken, routine maintenance of the W-14 Canal is expected to continue. As the maintenance activities occur within mowed rights-of-ways and do not extend into the surrounding forests, these actions would have no effect on mixed pine/bottomland hardwoods.

Future Conditions with the Proposed Action

Direct impacts of the proposed action include removal of approximately 7.32 acres of mixed pine / bottomland hardwood forest required to make canal improvements and removal of 11.7 acres to expand the Robert Boulevard Detention Pond, , and the taking of 0.3 acres to improve a perimeter levee in the West Diversion Detention Pond. The areas designated for detention pond expansion would be mechanically cleared and excavated using heavy equipment. The pond areas would be shaped to become low, flat, open fields, dry most of the time, and ready to accommodate floodwaters during high rain or storm events. Of the 7.32 acres required for construction easement along the canal banks, approximately 4.1 acres is expected to be only temporarily affected, and would regenerate naturally after project construction. The direct total loss of mixed pine/bottomland hardwoods for the entire project would be 19.32 acres. The Modified Charleston Method (MCM) variable justification model, indicates that 148.5 mitigation credits would be required to mitigate this loss (analysis is included in the appendix). See discussion of proposed fulfillment of this obligation in Mitigation Section, below.

Indirect impacts to remaining mixed pine/bottomland hardwood forests would include construction noise, fugitive dust, and temporary decreases in air quality if trees and brush subject to removal from the 19.32 acres are windrowed and burned in place. Minor cumulative effects would occur from the loss of moderate quality mixed pine/bottomland hardwood forest resources.

All efforts have been made to avoid, minimize, and reduce adverse impacts to mixed pine/bottomland hardwoods by designing the project to affect the minimum dimensions necessary for construction equipment access. Remaining unavoidable project impacts, estimated to be the loss of 19.32 acres of this habitat type, would be mitigated through the acquisition, rehabilitation, and maintenance of property adjacent to or holdings within Big Branch National Wildlife Reserve (NWR), in cooperation with the United States Fish and Wildlife Service (USFWS). As there are insufficient pine-savannah mitigation bank credits available, a mitigation plan centered on land acquisition and property rehabilitation would be necessary to meet project mitigation requirements. Currently four alternate tracts are under consideration for mitigation. A full discussion of the mitigation plan is in the Mitigation Section of this document (pg. 34).

**WILDLIFE**

Existing Conditions

This resource is institutionally important because of the Fish and Wildlife Coordination Act of 1958, as amended, and the Migratory Bird Treaty Act of 1918. Wildlife resources are technically important because they are a critical element of many valuable aquatic and terrestrial habitats, they are an indicator of the health of various aquatic and terrestrial habitats, and many species are important commercial resources. Wildlife resources are publicly important because of the high priority that the public places on their aesthetic, recreational, and commercial value.

Avian species likely to occur in the W-14 Canal area for occasional feeding and/or loafing include wood ducks, great egrets, snowy egrets, and green herons. 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 king snake, broad-banded water snake, and western cottonmouth. Mammals likely to occur in these areas are the Virginia opossum, northern raccoon, and nine-banded armadillo.

To quantify anticipated project impacts to fish and wildlife resources, the USFWS used the MCM to quantify impacts in the pine-savannah habitat type. Target years selected for this analysis were 0 (baseline), 1, 10, 25, and 50 for both future with project and future without project scenarios. Baseline values for model variables were obtained from site visits, communications with CEMVN staff, and review of aerial photography.

Future Conditions with No Action

With the no action alternative, habitat values and biological diversity in this ecological community would continue to be adversely impacted by increased residential and commercial development. Routine maintenance of the existing canal would continue, causing temporary adverse impacts to wildlife and their habitats. The presence and noise of heavy equipment used to maintain the W-14 channel would cause wildlife to disburse, but animals would be expected to return upon completion of maintenance operations.

Future Conditions with the Proposed Action

With the proposed action, wildlife inhabiting the area would flee during construction activities and may permanently relocate to adjacent undeveloped tracts of land. The direct effects to wildlife from construction would be the permanent destruction of 3.2 acres (excluding temporary impacts) of habitat by mechanical clearing and grubbing activities. The MCM was utilized to numerically assess habitat values of the pine-savannah habitat.

Direct, permanent impacts would include the loss of 11.7 acres of moderate to low quality wildlife habitat for the expansion of the Robert Road Detention Pond, a loss of 0.3 acres for berm improvement in the West Diversion Pond, and a loss of 7.32 acres for the drainage improvements to the W-14 Canal.

The loss of a total of 19.32 acres would be mitigated by purchase and restoration of 46 acres of pine savannah habitat.

Indirect wildlife impacts would include noise and fugitive dust from construction activities. These impacts would be temporary and not significant. The loss of wildlife habitat due to project construction would contribute cumulatively to habitat losses in southeast Louisiana.

## THREATENED OR ENDANGERED SPECIES

Existing Conditions

This resource is institutionally important because of the Endangered Species Act of 1973, as amended, and the Marine Mammal Protection Act of 1972. Threatened or endangered species are technically important because the status of such species provides an indication of the overall health of an ecosystem. These species are publicly important because of the desire of the public to protect them and their habitats.

Species listed as threatened or endangered in the area include the Louisiana quillwort, brown pelican, Gulf sturgeon, gopher tortoise, red-cockaded woodpecker, and ringed sawback turtle. Although these species of Federally-listed plants and animals occur within St. Tammany Parish, evaluations show that the proposed project area may provide suitable habitat for only the gopher tortoise and red-cockaded woodpecker. However the CEMVN determined on the basis of its fieldwork that the proposed action would be unlikely to affect gopher tortoises or red-cockaded woodpeckers, or their habitat**.** Two biologists from the USFWS also inspected the proposed project area and gathered field data on 15 October 2008. On 31 October 2008, the USFWS sent a letter indicating its concurrence with the CEMVN's determination that the project, as then proposed, would be unlikely to affect gopher tortoises or red-cockaded woodpeckers or their respective habitats.

For the present smaller-scale project, CEMVN has similarly concluded that the proposed action is not likely to adversely affect any Federally-listed threatened or endangered species or their critical habitat. The U.S. Fish and Wildlife Service concurred with this determination via letter received by CEMVN on October 12, 2011; a copy is attached.

Similarly, the CEMVN determined that no threatened or endangered aquatic marine species are likely to occur within the project area. No species under the purview of National Oceanic and Atmospheric Administration (NOAA) Fisheries is likely to be found in the proximity of the project action; therefore, the proposed action would have no effect on any NMFS-managed endangered species.

Future Conditions with No Action

If the proposed action is not undertaken, any threatened or endangered species that might stray into the project area would be subject to existing habitat conditions, which include considerable urban encroachment and the presence of various pollutants in the W-14 Canal waters and outfalls.

Future Conditions with the Proposed Action

With implementation of the proposed project, no impact on threatened or endangered species or their critical habitat is anticipated because of the absence of such species and habitats within the project area.

## SOCIOECONOMIC RESOURCES

The focus of this section is to evaluate the range of socioeconomic impacts that residents of the project area may experience from construction and use of the flood damage reduction improvements outlined in this report.

### POPULATION AND HOUSING

#### Existing Conditions

The project area is surrounded by wooded areas as well as neighborhoods of single-family and multi-family residential structures and commercial buildings. Under the recommended plan, three reaches of the W-14 Canal would be subject to clearing and snagging and partial reconstruction. For the reach of W-14 running from Daney Street to Interstate 10, already-completed channel improvements constructed by St. Tammany Parish in 2010 are incorporated into the proposed project. For the portion of the W-14 Canal between Interstate Highway 12 and Fremaux Avenue, the channel runs through a developed area with some residential properties abutting the canal. For the reach of the W-14 Canal between Fremaux Avenue and Interstate Highway 10, the channel traverses a primarily wooded area.

The proposed work also includes construction of a West Diversion Detention pond on the west side of U.S. Highway 11 near North Boulevard. The detention pond would be located in Census Tract 411.03, Block Group 1, Block 1055, which according to 2010 U.S. Census data, had no residents or housing units within its boundaries. The proposed project also includes expanding the Robert Boulevard Detention Pond approximately 11.7 acres (from 19.6 to 31.3) and construction of a weir just north of Robert Boulevard. This area is located in Census Tract 410.04, Block Group 1, Block 1027 and has housing units along its northern border. Additionally, one residential property with a barn is located to the west of the detention pond within the proposed expansion area.

Also included in the proposed project is the replacement of the existing Florida Avenue Bridge (located south of U.S. Highway 190) with a 45-ft clearspan bridge. The bridge is located in a developed area with residences in close proximity.

#### Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to population and housing due to project construction under this alternative. However, a heightened risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would continue to require routine maintenance operations.

#### Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

Under the proposed action, temporary, construction-related impacts to residents may be felt in the immediate vicinity of the areas along the W-14 Canal, particularly the portion of the W-14 Canal that runs through a developed area between I-12 and Fremaux Avenue and in the vicinity

of the Florida Avenue Bridge. These may include increased noise levels, degraded air quality, increased congestion on neighborhood roadways, and a higher risk of vehicular accidents due to the additional volume of traffic and congestion. Additionally, while no displacement of population is necessary under the proposed alternative, one parcel of land with a barn lies within the Robert Boulevard Detention Pond expansion footprint.

Apart from temporal inconveniences caused by project construction, no adverse, indirect or cumulative impacts to population and housing are anticipated under the proposed action. Residents would enjoy a reduced risk of displacement from flooding due to the additional flood protection the project would provide.

EMPLOYMENT, BUSINESSES, AND INDUSTRIAL ACTIVITY

Existing Conditions

The proposed project encompasses a roughly four mile stretch of the W-14 canal in Slidell, LA between Interstate Highway 12 and Interstate Highway 10. The northern portion runs through a developed area which contains mixed retail and light industry. The southern portion is sparsely developed with little to no businesses or industrial activity near the proposed project, with the exception of a water sewer treatment plant.

Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to employment, businesses, and industrial activity under this alternative. However, the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

Temporary, direct impacts may occur to area businesses near project construction sites and along the W-14 Canal due to delays caused by increased traffic congestion. Customers may choose to shop away from the project vicinity in order to avoid congestion. However, these impacts would be expected to be temporary and negligible. There may be a temporary, minor increase in employment as a result of construction activity. No indirect or cumulative impacts would be expected to occur as a result of the project.

**PUBLIC FACILITIES AND SERVICES**

Existing Conditions

South of Robert Blvd and north of Highway 190, the W-14 Canal passes between St. Margaret Mary School and Bonne Ecole Elementary School. Seven other schools not directly adjacent to the construction sites are nearby. The St. Tammany Community Health Center, SMH Center for Family Health, and the Slidell Memorial Hospital are located near the existing Florida Avenue Bridge which would be replaced under the proposed project.

Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to public facilities and services under this alternative. However, the risk of flooding to public facilities within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

Under the proposed action, there may be temporary, construction-related impacts to public facilities in the immediate vicinity of the proposed actions. These impacts may include increased noise levels, degraded air quality, increased congestion on neighborhood roadways, and a higher risk of vehicular accidents due to the additional volume of traffic and congestion. No adverse indirect or cumulative impacts to public facilities and services are expected to occur if the proposed project is constructed.

**TRANSPORTATION**

Existing Conditions

Transportation infrastructure within the vicinity of the project includes Interstate Highway 12, Gause Boulevard, U.S. Highway 190, Interstate Highway 10, U.S. Highway 11, and municipal thoroughfares. Railroad lines parallel U.S. Highway 11, and a municipal airport is located just north of Interstate Highway 12 in the vicinity of the study area. The project area has waterborne access via Lake Pontchartrain.

Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to transportation under this alternative. However, the risk of flooding within the W-14 Canal drainage basin would persist, and there are substantial traffic effects prior to, during, and after large-scale flooding events in this area with the current level of risk reduction.

Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

With construction of the proposed alternative, a temporary increase of vehicular congestion along collector and local roads leading to and from project construction sites would occur. Direct beneficial impacts to local transportation include the replacement of the Florida Avenue bridge. Indirect temporary effects of project construction would include heightened vehicle emissions due to congestion, decreases in the level of service provided by public and commercial vehicles (e.g., longer waits at intersections), and decreases in road surface quality on other major and local roads in the project area would be expected. No impacts to rail transportation systems are anticipated. No cumulative impacts to transportation facilities are anticipated as a result of

the proposed action.

## COMMUNITY AND REGIONAL GROWTH

Existing Conditions

Community and regional growth is influenced by national trends as well as local demographic attributes. In Louisiana, growth trends are also closely related to reliable flood protection. The proposed project would reduce the risk of flood in the city of Slidell, LA. Between 2000 and 2010, the population of Slidell, LA increased from 25,695 to 27,068 according to U.S. Census data. Per capita personal income increased from $19,947 to $22,820 and employment increased from 11,329 to 11,906 between 2000 and the 2005-2009 period, according to the latest income and employment data available from the U.S. Census Bureau.

Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to community and regional growth under this alternative. However, a heightened risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

Increased protection from flooding would preserve and enhance community and regional growth.

## TAX REVENUES AND PROPERTY VALUES

Existing Conditions

The proposed project is located in Slidell, LA. According to the latest data available from the U.S. Census Bureau, the average median value for specified owner-occupied housing units in Slidell, LA in the 2005-2009 period was $162,800.

Future Conditions with No Action

*Direct, Indirect, Cumulative Impacts*

There would be no direct, indirect, or cumulative impacts to tax revenues and property values under this alternative. However, the risk of flooding to human life and economic infrastructure within the W-14 Canal drainage basin would persist, and the existing W-14 Canal would require routine maintenance operations.

Future Conditions with the Proposed Action

*Direct, Indirect, Cumulative Impacts*

Property values near the construction site may decrease temporarily due to added traffic congestion and construction noise and dust. There should be no significant indirect or cumulative impacts on tax revenues for the city of Slidell as a result of the proposed action.

## ENVIRONMENTAL JUSTICE

Environmental Justice (EJ) is institutionally significant because of Executive Order 12898 of 1994 (E.O. 12898) and the Department of Defense's Strategy on Environmental Justice of 1995, which direct Federal agencies to identify and address any disproportionately high adverse human health or environmental effects of Federal actions to minority and/or low-income populations.

Analysis of 2010 U.S. Census data shows that the city of Slidell exceeds neither the 50 percent minority threshold nor the 20 percent low-income threshold established in Executive Order 12898, and therefore does not qualify as an Environmental Justice study area.

## CULTURAL RESOURCES

Existing Conditions

This resource is institutionally important because of the National Historic Preservation Act of 1966, as amended, the Native American Graves Protection and Repatriation Act of 1990, and the Archeological Resources Protection Act of 1979, as well as other statutes. Cultural resources are technically important because of their association or linkage to past events, to historically important persons, and to design and/or construction values, and for their ability to yield important information about prehistory and history. Cultural resources are publicly important because preservation groups and private individuals support their protection, restoration, enhancement, or recovery.

A cultural resources investigation of the original W-14 project area, as then defined, was conducted in 2008 by R. Christopher Goodwin and Associates, Inc (Moreno, et al. 2008). This study states that the prehistoric and historic residents of St. Tammany Parish and the project vicinity would have exploited the natural resources from both the longleaf pine and marsh environments of this area. Of seven previous cultural resources investigations conducted within 1.l6 km (1 mile) of the project area, only five cultural resource sites were identified within 1.6 km of the current project area, indicating a general lack of historical cultural resources in the project vicinity. The cultural resources investigation located no prehistoric or historic cultural resources within the project area. A determination of no impacts to cultural resources was submitted to the Louisiana State Historic Preservation Officer on 9 September 2008. A letter of concurrence was received on 7 October 2008.

The revised W-14 project area includes a small area not previously investigated by Moreno et al. (2008). The area was visited and examined by MVN archaeologist Dr. Paul Hughbanks in 2011, who located no prehistoric or cultural resources or potential for hidden cultural resources. A determination of no impacts to cultural resources was submitted to the Louisiana State Historic Preservation Officer on September 22, 2011. A letter of concurrence was received on November 16, 2011.

Future Conditions with No Action

With the no action alternative, cultural resources would not be affected. The current state of any known or unknown resources in the project vicinity would be unaffected. However, if lack of modification to the W-14 Canal allows increased flooding in the City of Slidell, cultural resources could be adversely affected by these flood situations.

Future Conditions with the Proposed Action

With the proposed action, there would be no impacts to cultural resources. A cultural resources study was conducted to identify cultural resources, and testing and research determined that no cultural resources exist within the project area. This conclusion of no impacts to cultural resources was coordinated with the Louisiana State Historic Preservation Officer in correspondence as stated previously.

## RECREATIONAL RESOURCES

This resource is institutionally important because of the Federal Water Project Recreation Act of 1965, as amended, and the Land and Water Conservation Fund Act of 1965, as amended. Recreational resources are technically important because of the high economic significance of these recreational activities and their contribution to local, state, and national economies. Recreational resources are publicly important because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large number of recreational boat registrations.

Existing Conditions

Canals

*Interstate 12 to Fremaux Avenue*

The Pinewood Country Club is located adjacent to the project area. The member owned semi-private club provides an 18-hole golf course, practice facility, two lighted tennis courts, and a competition size swimming pool with a separate wading pool. The clubhouse includes a cocktail lounge and restaurant, meeting and card rooms, full service golf shop, and a Grand Ballroom available for rental. Special activities at the country club include Oktoberfest dinners, poolside Luaus, and holiday buffets and events.

The Pinewood Porpoise Swim Team utilizes the pool and consists of over 100 swimmers who compete in the St. Tammany Parish Swim League. Swim lessons are also available at the pool.

The canal at this location is narrow and unsuitable for boating, and the water quality is not conducive to fishing and swimming.

*Fremaux Avenue to Daney Street*

There is no developed recreation within the project area. The canal in this location is also

narrow and unsuitable for boating, fishing, and swimming.

*Daney Street to Interstate 10*

The Slidell Bantam Baseball Association (SBBA) Complex is adjacent to the project area. The complex includes twelve baseball/softball fields, three football fields, soccer fields, and a gym with basketball and volleyball courts. There are more than 40 baseball/softball leagues that use the fields.

The canal at this location is approximately 40 feet wide; however, it is still unsuitable for boating, fishing, and swimming.

Detention Ponds

The West Diversion Detention Pond and the Robert Road Detention Pond are approximately 11 acres and 31 acres in size, respectively. The ponds are usually dry for most of the year; however, they start to fill when rainfall exceeds 2 inches. Due to the lack of consistent water levels, the ponds are not conducive to recreational activities such as boating and fishing.

*West Diversion Detention Pond*

There is no developed recreation within the project area.

*Robert Boulevard Detention Pond and Weir*

There is no developed recreation within the project area.

Bridge Relocation

*Florida Avenue Bridge*

There is no developed recreation within the project area.

Future Conditions with No Action

Without implementation of the proposed action, the recreational environment would continue unchanged and would be dictated by the natural land use patterns and processes that have dominated the area in the past. Recreation facilities would remain vulnerable to floods.

Future Conditions with the Proposed Action

Canals

*Interstate 12 to Fremaux Avenue*

The Pinewood Country Club Golf Course and holes 2, 3, and 7 are within 25 feet of the existing right of way. Dust and noise from equipment may affect golfers during construction activities. Recreation facilities within Slidell would benefit from flood risk reduction.

*Fremaux Avenue to Daney Street*

No direct or indirect impacts to recreation are expected. Recreation facilities within Slidell would benefit from flood risk reduction.

*Daney Street to Interstate 10*

SBAA Complex Fields D, A, and E are closest to the project area. Field D is approximately 80 feet from the project area. Dust and noise from equipment may affect softball/baseball players during construction activities. This impact may be reduced by the trees located between the ball fields and the canal. Recreation facilities within Slidell would benefit from flood risk reduction.

Detention Ponds

*West Diversion Detention Pond*

No direct or indirect impacts to recreation are expected. Recreation facilities within Slidell would benefit from flood risk reduction.

*Robert Boulevard Detention Pond and Weir*

No direct or indirect impacts to recreation are expected. Recreation facilities within Slidell would benefit from flood risk reduction.

Bridge Relocation

*Florida Avenue Bridge*

No direct or indirect impacts to recreation are expected. Recreation facilities within Slidell would benefit from flood risk reduction.

No adverse cumulative effects are anticipated to this resource.

## AESTHETIC (VISUAL) RESOURCES

This resource is institutionally important because of the laws and policies that affect visual resources, most notably the 1969 National Environmental Policy Act (NEPA) and USACE ER 1105-2-100. Visual resources are technically important because of the high value placed on the preservation of unique geological, botanical, and cultural features. Aesthetic resources are publically important in that environmental organizations and the public support the preservation of natural pleasing vistas.

Existing Conditions

**Existing Structures:** Structures are too numerous to name and cover the entire project area from north to south, Interstate 12 to Interstate 10. The dense, urban area features homes constructed of wood, brick and a variety of other veneers. Ages of homes in the project area range from 19thC to modern day. Commercial areas feature buildings that range from one story to taller than thirty five (35) feet. These structures are often constructed with such materials as aluminum, steel, tempered and mirrored glass, concrete, and brick and mortar. Industrial structures are not common. The most notable industrial structure would be the sewer treatment plant, located to the south of and adjacent to the project area.

Natural structures, such as levees, reservoirs, canals, and those associated with parks and recreation facilities are also numerous. On the northern side of the project area resides Pinewood Country Club. The country club features an eighteen (18) hole championship golf course

complete with water hazards, sand bunkers and a variety of man-made terrains. On the south side of the project site, is the Slidell Baseball Association (SBBA) Complex. This recreation and athletic complex features several baseball fields, soccer/ football fields, concessions, lighting systems, internal circulation routes and parking.

**Water:** The Louisiana Scenic Rivers Act of 1988 was established to preserve, protect, and enhance the wilderness qualities, scenic beauties, and ecological regimes of rivers and streams in the state. Scenic Rivers in the region include Cane Bayou and Bayou Lacombe, to the west, and West Pearl River and Morgan River, to the east. None of these Scenic Rivers is near the immediate project area, and the aesthetic values of none of t hese waterways will not be impacted by the proposed work.

Other water resources are abundant throughout the Slidell area. The W-14 Canal and its associated (existing) detention ponds are the most obvious water resources in or near the project area. Other resources include a variety of ponds and lakes, Bayou Bonfouca, Liberty Bayou, the marina community at North Shore and Lake Pontchartrain.

**Land Use:** The dominant Eco-Region (according to the State of Louisiana Eco-Region Map) is Gulf Coast Flatwoods (Daigle *et al.*, 2006). Other nearby Eco-Regions include Coastal Marshes, Gulf Barrier Islands and Marshes, Floodplains and Low Terraces, and Lake Pontchartrain.

The project area is characteristic of the Gulf Coast Flatwoods eco-region, with nearly level terraces, poor to moderately well drained soils that typically have a silty and fine sandy loam texture. Historically, longleaf pine dominated the broad flats and low ridges, forming more densely-stocked flatwoods and open savannas. A high natural fire frequency was typical, often sparked by lightning and fueled by grasses, and maintained the open pine flatwoods and savannas. While most of the longleaf pine savannas have been lost, remnant savannas are centers of biodiversity supporting a variety of grasses, sedges, rushes, and an array of wildflowers: red lilies, orange milkweeds, yellow pitcher plants, white, orange, and pink orchids, lavender butterworts, and purple sundews. Much of the landscape is now in mixed forest or pine plantations, while some better-drained land has been cleared for pasture or crops (Griffith and Obernik, 2008).

As with most cities, land use varies greatly in the Slidell area. Key uses most associated with those lands adjacent to the W-14 Canal include Parks and Open Space, Public/ Quasi-Public, Single-Family Residential, General Commercial, and Heavy Industrial.

In January 2008, the City of Slidell commissioned the Tulane Regional Urban Design Center (TRUDC) to create a set of Design Guidelines that would govern Slidell's Olde Towne Preservation District and the Fremaux Avenue Corridor. This request was made in an effort to reinforce the important efforts of the Olde Towne District Advisory Commission, and to address the expected development pressures brought by the connection of Fremaux Avenue to Interstate 10. The City of Slidell has identified a need to promote quality design practices within the Olde Towne Preservation District, in order to maintain and improve the urban environment and economic viability of this area, while simultaneously focusing on the Fremaux Avenue Corridor in order to help control the appearance and quality of construction along this commercial corridor as development pressure continues to rise. The City of Slidell and its citizens seek to

recognize, preserve, and protect the cultural and historic architecture and urban design within Olde Towne and along the Fremaux Avenue corridor.

**Landform and Vegetation:** The fringe habitat immediately adjacent to the W-14 channel banks is composed primarily of, urban forests composed of hardwoods, various pine species and invasive species. View sheds from crossing thoroughfares are typically high in scenic quality, due to the W-14 Canal's appearance as more of a natural, rather than man-made, feature.

While litter does seem to be a problem along some of the banks of the W-14 Canal, over all, the landscape of the project areas is scenic and contains those visual qualities and characteristics that make it memorable and/or unique compared to other water bodies in the surrounding area. There are no known specifically identified protected trees or other plant materials in the immediate project area.

Overall, the terrain of the project area is relatively flat with occasional, small ridges.

**Access:** Visual public access to the project site(s) is abundant. Several major thoroughfares, including Gause Boulevard, Fremaux Avenue, Florida Avenue, Daney Street, Independence Drive and North Boulevard all intersect and cross the W-14 Canal. Louisiana Highway 11 runs parallel to W-14 Canal for a short distance. In most cases, these thoroughfares include sidewalks that also provide public visual access to the project site(s). There are no known national or state designated scenic byways in or near the project area.

Future Conditions with No Action

With the no action alternative, the proposed action would not be constructed by the CEMVN and the aesthetic resources of the project area would remain as presently composed. However, the existing W-14 Canal would continue to require routine maintenance operations. Visual resources would evolve in a natural process and experience change as a consequence of W-14 maintenance practices.

Future Conditions with the Proposed Action

Canal Improvement Features

Clearing and snagging, and vegetation removal to clean up the W-14 Canal, will bring only minimal impacts to the portions of the project area between Interstate 12 and Fremaux Avenue. The natural setting will still be maintained and significant tree removal will be negligible.

Impacts to the portion of the W-14 Canal from Fremaux Avenue to Daney Street, will be similar to those in the previous paragraph. The ten (10) foot channel bottom width will require the loss of more vegetation. However, it is important to note that there will be no bank armoring, so the natural scene that was previously along the banks of the canal, will be allowed to return to its natural condition over the course of time.

The portion of the canal from Daney Street to Interstate 10 presents the most significant alteration to the landscape. This portion of the plan (which has already been implemented as of 09/2011) presents a forty (40) foot bottom width that required the removal of a large number of

trees and vegetation. As with the other Canal Improvement Features, this portion will be allowed to return to its natural condition over the course of time.

Detention Pond Features

The expansion and deepening of the Robert Boulevard Detention Pond, and construction of an associated weir, will have minimal impacts to visual resources in the area. View sheds to the detention pond and its associated facilities are blocked by thick vegetation along all adjacent property lines and thoroughfares.

The berm improvements in the West Diversion Detention Pond will have minimal impacts to visual resources in the area. View sheds to the detention pond and its associated facilities are blocked by thick vegetation along all adjacent property lines and thoroughfares.

Relocation of Bridges

Relocation of Florida Avenue Bridge will bring some minor changes to the landscape of its immediate area. The current bridge rests in an area that is forested primarily with street trees and that vegetation that hugs the banks of the W-14 Canal. The replacement of the existing bridge will also bring removal of much of the vegetation that surrounds it. However, as with other portions of the project area, the natural conditions will be allowed to return over the course of time.

Impacts to the Proposed Action in General

With implementation of the proposed action, temporary impacts to visual resources would occur across the project area as a whole. The visual attributes of the project corridor would be temporarily impacted by construction activities at the project sites and by transport activities needed to move equipment and materials to and from the sites. However, these impacts would last only through the period when the flood control project is under construction.

## HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

The CEMVN is obligated under Engineer Regulation 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within the vicinity of the proposed action.

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 as part of "Southeast Louisiana (SELA) Flood Control, Stormwater Drainage Canal, and Retention Ponds in Slidell, Louisiana." CEMVN contractors, Strategic Planning Associates and Materials Management, collected a total of twenty samples at six sites of interest. Total Petroleum Hydrocarbon-Diesel (TPH-D) was present at concentrations exceeding the Louisiana Department of Environmental Quality's Risk Evaluation/Corrective Action Program (RECAP) standards at two sample locations in the drainage canal south of Shortcut (Fremaux) Highway. Total Petroleum Hydrocarbon-Oil (TPH-

O) was present at elevated concentrations at one sample point in the canal south of Shortcut Highway. Urban drainage canals are all likely to show some contamination, due to runoff from roads. Petroleum hydrocarbons are likely to be found. Any dredged material will be considered likely to be contaminated and will be placed into an appropriate landfill.

Methylene chloride exceeded the standard at one sample point; methylene chloride is a very common laboratory contaminant. Lack of other contaminants associated with the use of methylene chloride (metal cleansing or paint removal contaminants) indicates that it is most likely an artifact of laboratory contamination. In addition, a split sample showed no methylene chloride. Therefore, the methylene chloride concentration at one sample point does not require further consideration.

USACE-MVN personnel made a field inspection of the W-14 Canal on 12 September 2011. No signs of HTRW were found. Other than the probable contamination of canal sediments, no Recognized Environmental Conditions (RECs) were identified. The probability is low of encountering HTRW during the course of the canal improvement work, except in dredged sediments, which will be appropriately disposed. No further investigation of HTRW related to the proposed project is recommended, and the project may proceed as scheduled.

Future Conditions with No Action

With no action, there would be little probability of increased HTRW exposure, because any contaminated sediments would remain in the canal bottom.

Future Conditions with the Proposed Action

With the proposed action, the dredged material from the canal between Fremaux Avenue and Daney Street may present the possibility of exposure to petroleum hydrocarbons. However, all dredged material will be placed in an appropriate landfill.

## CUMULATIVE IMPACTS

The Council on Environmental Quality Regulations define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR §1508.7)."

The proposed project is part of a larger Orleans, Jefferson, and St. Tammany Parish project, (SELA), designed to reduce adverse effects of the risk of flooding in residential, commercial, and industrial development in the metropolitan New Orleans area. Providing the City of Slidell with the flood control improvements of the proposed project would reduce the risk to persons and property of flooding , resulting in a reduced risk to life, property and the Slidell environment.

Major flooding often results in contamination of drinking water supplies, dispersion of HTRW, and dispersion of large quantities of solid waste that require clean up and disposal. Experience has shown that vast quantities of debris (e.g., homes, vehicles, mobile homes, etc.)

and sediment must be collected and hauled away after a flooding event. Hauling the collected debris to a local municipal landfill requires a great deal of transportation and involves large quantities of solid waste that fill available landfill space. The improved urban drainage provided by this project would significantly reduce the risk of water contamination, HTRW dispersion and solid waste creation in the flood plain reaches that would otherwise suffer flooding if the improvements were not constructed.

Negative effects associated with implementation of the proposed action that could contribute cumulatively with the effects of other projects would include temporary construction-related increases in truck traffic, noise, vehicle and equipment emissions, and degradation of water quality. The projected permanent loss of 19.32 acres of moderate to low quality mixed pine/bottomland hardwoods habitat occasioned by the project must be added to the cumulative habitat loss resulting from development activity throughout St. Tammany Parish. However, the cumulative environmental impact of the loss of a narrow strip of habitat isolated within a project corridor largely traversing a developed suburban landscape is substantially lower than the loss of equivalent acreage from a functional forest ecosystem.

The positive cumulative effects of implementing the proposed action would include the temporary expansion of the local economy through the influx of construction-related expenditures, greater security from flood risk for community residents and potentially enhanced property values.

## COORDINATION

Preparation of this EA is being coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. The following agencies, as well as other interested parties, are receiving copies of this EA:

U.S. Department of the Interior, Fish and Wildlife Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Commerce, NOAA Fisheries
U.S. Natural Resources Conservation Service, State Conservationist
Advisory Council on Historic Preservation
Governor's Executive Assistant for Coastal Activities
Louisiana Department of Wildlife and Fisheries
Louisiana Department of Natural Resources, Coastal Management Division
Louisiana Department of Natural Resources, Coastal Restoration Division
Louisiana Department of Environmental Quality, PER-REGC
Louisiana Department of Environmental Quality, EP-SIP
Louisiana State Historic Preservation Officer

## MITIGATION

The unavoidable loss of 19.32 acres of mixed pine/bottomland hardwood habitat would be compensated through the acquisition, management, maintenance, and monitoring of a mitigation site, through coordination with the interagency team and the non-Federal sponsor. As insufficient pine-savannah mitigation bank credits are available within the watershed, a

mitigation plan centered on land acquisition and rehabilitation of property is appropriate to meet project mitigation requirements.

The Modified Charleston Method of habitat assessment was used to determine the number of credits/acres that would be required at the mitigation site to compensate for unavoidable project impacts. The results of this assessment indicated that 148.5 credits/46 acres of pine savannah/bottomland hardwoods habitat would need to be acquired, managed, maintained, and monitored to appropriately mitigate for the project's removal of 19.32 acres of mixed pine/bottomland hardwood habitat. Four tracts of land (the Blossman #1, Blossman #2, Elmwood, and a portion of the Mentab tract) adjacent to the Big Branch Marsh NWR have been identified as possible areas in which to obtain the required mitigation credits. The non-Federal sponsor would purchase the necessary acreage to meet the mitigation requirements and then transfer ownership of the property to the USFWS for incorporation into the boundaries of Big Branch Marsh NWR. A 50-year management and monitoring plan has been prepared for long-term success of the mitigation site and is discussed below (the full mitigation plan can be found in the appendix):

The 52-acre Blossman #1 tract is currently comprised of a slash/loblolly pine stand with an herbaceous understory and sparse midstory due to frequent fire. It is estimated that it would take no more than 5 years to return to pine savannah function because large pine trees currently exist on site. A hardwood drain is present and Chinese tallow trees are found intermittently throughout the site.

The 41.6-acre Blossman #2 tract is currently comprised of an immature stand of slash/loblolly pine after having been logged approximately 15 years ago. It would take 10 years to 20 years to replace pine/savannah functions on this tract than other tracts (Blossman #1, Elmwood, or Mentab). This site is also bisected by a slough, which has an abundance of bottomland hardwood species.

The 36-acre Elmwood tract is comprised of longleaf, loblolly, and slash pine stand, and would take 0 to 5 years to return to pine savannah function because more mature pine trees currently exist on site. A portion of the tract contains an herbaceous understory with sparse midstory while other areas contain a moderate hardwood midstory approximately 5 feet to 10 feet in height. Chinese tallow trees are found intermittently throughout the site.

The 322-acre Mentab tract (of which 33.5 acres is included in the subject mitigation proposal) was clearcut approximately 12 years ago and subsequently bedded and replanted with loblolly pine. Because large pine trees currently exist on the tract, it is estimated that it would take a reduced time (0 to 5 years) for this tract to replace pine/savannah function.

Of the four tracts of land under consideration for mitigation, the Blossman #1 tract is approximately the right size and has approximately the right amount of credit potential to mitigate for project impacts. Currently it is the preferred site for mitigation, but further investigations and analyses will be performed to ascertain the best available tract at a price that minimizes costs and optimizes mitigation success.

Existing drains, dams, plowed fire lanes, and other surface feature alterations (i.e., bedding, disking, logging ruts, or placement of fill) on tracts to be planted would be degraded prior to

planting to restore natural surface contours to the maximum extent practicable. Resultant ground surface elevations would be made conducive to the establishment and support of wetland vegetation.

Drainage and roadside ditches, which enhance the removal of water from planted tracts, would be plugged, backfilled, or otherwise made ineffective. Roadways that are to be maintained for access would have culverts installed as needed to insure that surface flow is not impeded, and to minimize creation of the roadway as a surface flow dam. Structures installed for the purposes of restoring natural hydrology would be maintained in good repair and would be functional at all times.

Monitoring the response of pine savannah to restoration and management actions (including appropriate fire management), would be necessary to ensure the success of the mitigation project. The non-Federal sponsor would acquire data in years 1, 3 and 5, and every 5 years thereafter following implementation of initial restorative actions and submit collected data to the CEMVN Environmental Compliance Branch. Reports would be submitted as follows: baseline data (prior to beginning site restoration), a planting and hydrologic restoration report (upon completion of the work; may be included with the baseline if occurring in the same year), an initial success criteria report (one year after planting), an interim success criteria report (year three). Long-term success criteria reports (year five and every fifth year thereafter). The reports would include a summary of where, when, and percent coverage of burns that have occurred since the previous monitoring report. Data collected for initial, interim, and long-term monitoring would be the same as for baseline conditions using the same sample plots.

Funding for management, maintenance, and monitoring purposes would be achieved through the use of an escrow account, set up by the non-Federal sponsor, and implemented by refuge personnel (under a separate agreement with the non-Federal sponsor).

While it is the intent of the CEMVN to utilize the mitigation plan to compensate for unavoidable project impacts, an alternative plan may be substituted, if necessary, for example, if negotiations to purchase the required acreage within one of the identified tracts prove unsuccessful. In such case, members of the interagency team, which is composed of representatives from the CEMVN and the natural resource agencies, would meet and decide on appropriate alternate mitigation for this project.

## COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Environmental compliance for the proposed action would be achieved upon coordination of this EA with appropriate agencies, organizations, and individuals for their review and comments. In a letter dated 12 October 2011 the U.S. Fish and Wildlife Service (USFWS) concurred that the proposed action is not likely to adversely affect any threatened or endangered species or their critical habitat. A State Water Quality Certificate (WQC 081015-04/AI 161334, dated 1 November 2011, was received from the Louisiana Department of Environmental Quality. In a letter dated 2 October 2008, the Louisiana Department of Natural Resources concurred with the determination that the proposed action is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program (#C20080380). Public review of the Section 404(b)(1) Public Notice was completed on 10 July 2009 . The Section 404(b)(1) evaluation was signed on

14 July 2009. In a letter dated 16 November 2011, the Louisiana State Historic Preservation Officer (SHPO) concurred with a recommendation of no effect on historic properties. .

The USFWS reviewed the proposed action in accordance with the Fish and Wildlife Coordination Act and has provided a draft Coordination Act Report for SEA #409A dated 16 November 2011. A final report will be prepared after the 30-day public review of SEA #409A.

The USFWS' project-specific recommendations in their 16 November 2011 Draft Coordination Act Report and CEMVN's responses to the recommendations are listed below:

USFWS Recommendation 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."

CEMVN Response 1: Concur. CEMVN will work with the Service to determine which of the four potential mitigation sites is best suited to provide the required mitigation.

USFWS Recommendation 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."

CEMVN Response 2: Concur. Any changes to the project during planning and/or construction stages will be fully coordinated with the Service.

USFWS Recommendation 3: "All clearing and snagging shall adhere to the Stream Obstruction Removal Guidelines (1983) developed by the Stream Renovation Guidelines Committee."

CEMVN Response 3: Concur. All clearing and snagging operations shall conform to applicable best management practices, in particular the USFWS's Stream Obstruction Removal Guidelines.

USFWS Recommendation 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."

CEMVN Response 4: Concur.

USFWS Recommendation 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."

CEMVN Response 5: Concur. Only debris that is obstructing flow or that may likely cause problems in the near future will be removed.

USFWS Recommendation 6: "Equipment that would minimize damage to instream and riparian habitat (i.e., chain saws, flatboats, etc.) shall be used."

CEMVN Response 6: Concur.

USFWS Recommendation 7: "Access routes for equipment shall be selected to minimize floodplain disturbance (i.e., bridge rights-of-way for access to channel)."

CEMVN Response 7: Concur. Access routes will be selected to minimize damage to riparian habitat.

## CONCLUSION

The proposed action consists of improving approximately 4.4 miles of the existing W-14 Canal by clearing, snagging, and widening the existing canal and lowering its existing invert elevation to improve flood flow capacity, expanding an existing detention pond, incorporating an existing detention pond, and replacing (relocating) one bridge. All excavated material from the W-14 Canal project would be sent to an approved solid waste landfill. The unavoidable loss of 19.32 acres of mixed pine/bottomland hardwood habitat would be compensated through the acquisition, management, maintenance, and monitoring of a 46-acre mitigation site, which has been coordinated with the interagency team and the non-Federal sponsor.

This office has assessed the environmental impacts of the proposed action and has determined that the proposed action would have no significant impacts on the following resources: air quality, water quality, aquatic resources, wetlands, wildlife, essential fish habitat, threatened and endangered species or their critical habitats, socioeconomic resources, cultural resources, recreational resources, and aesthetic (visual) resources. It was also determined that the risk of encountering hazardous, toxic, and radioactive waste is low.

## PREPARERS

SEA # 409 was prepared by Mr. Joseph Musso – Environmental Resource Specialist, with relevant sections prepared by: Mr. Paul Hughbanks – Cultural Resources; Ms. Debra Wright – Recreation Resources; Mr. Kelly McCaffrey – Aesthetic (Visual) Resources; Dr. J. Christopher Brown – HTRW; Ms. Crystal Braun and Ms. Kayla Fontenot– Socioeconomic Resources; and Ms. Donna Urban – Project Manager. The address of the preparers is U.S. Army Corps of Engineers, New Orleans District; Regional Planning and Environment Division, South, Environmental Compliance Branch, Coastal Environmental Compliance Section, CEMVN-PDC-CEC, Attn: Joseph Musso ; P.O. Box 60267; New Orleans, Louisiana 70160-0267.

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## APPENDIX

USFWS Draft Coordination Act Report (including Mitigation Credits Worksheet - Modified Charleston Method)
Mitigation Plan for Pine Savannah Restoration

# APPENDIX

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*

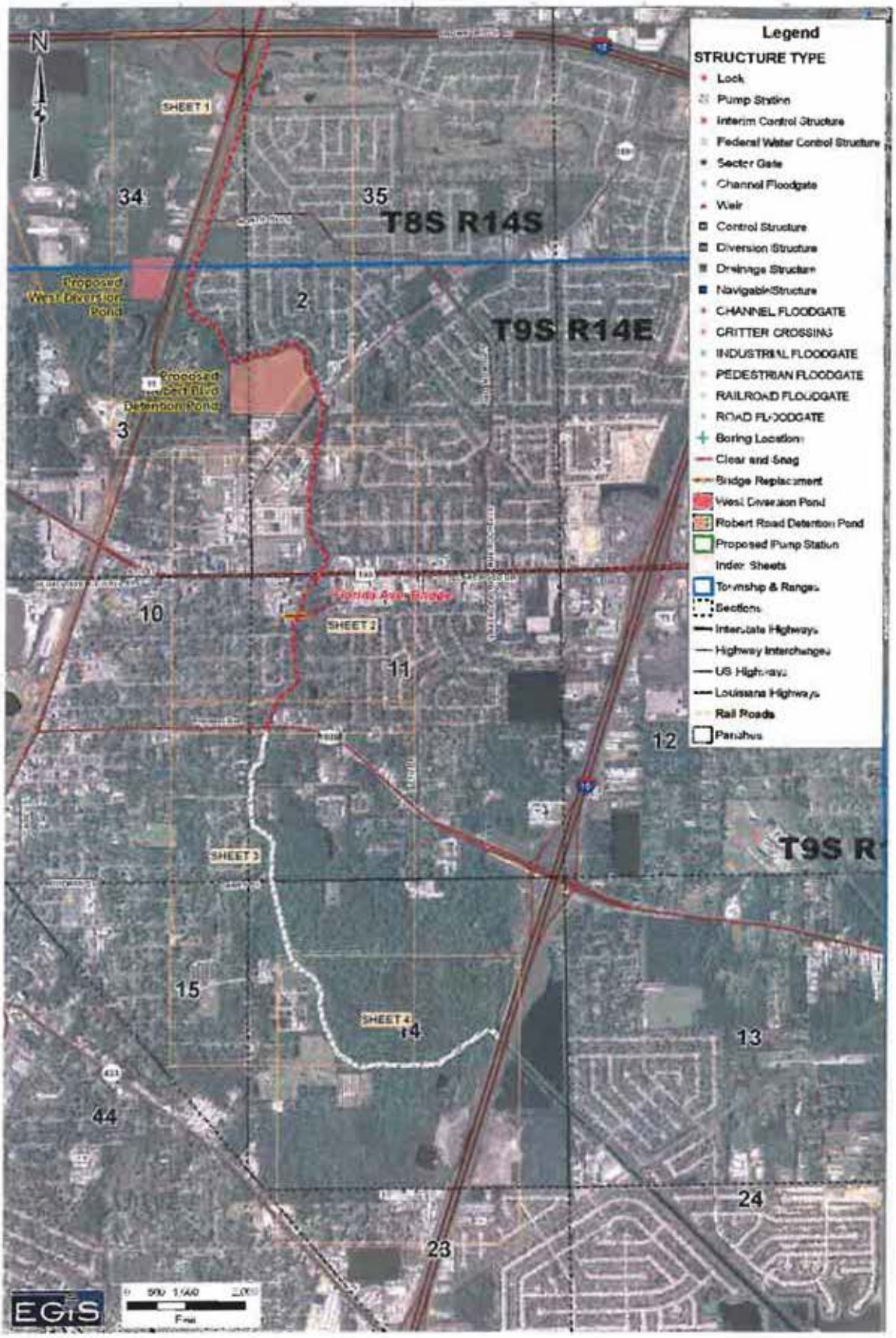


***Image provided by the New Orleans District Corps of Engineers.**

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.

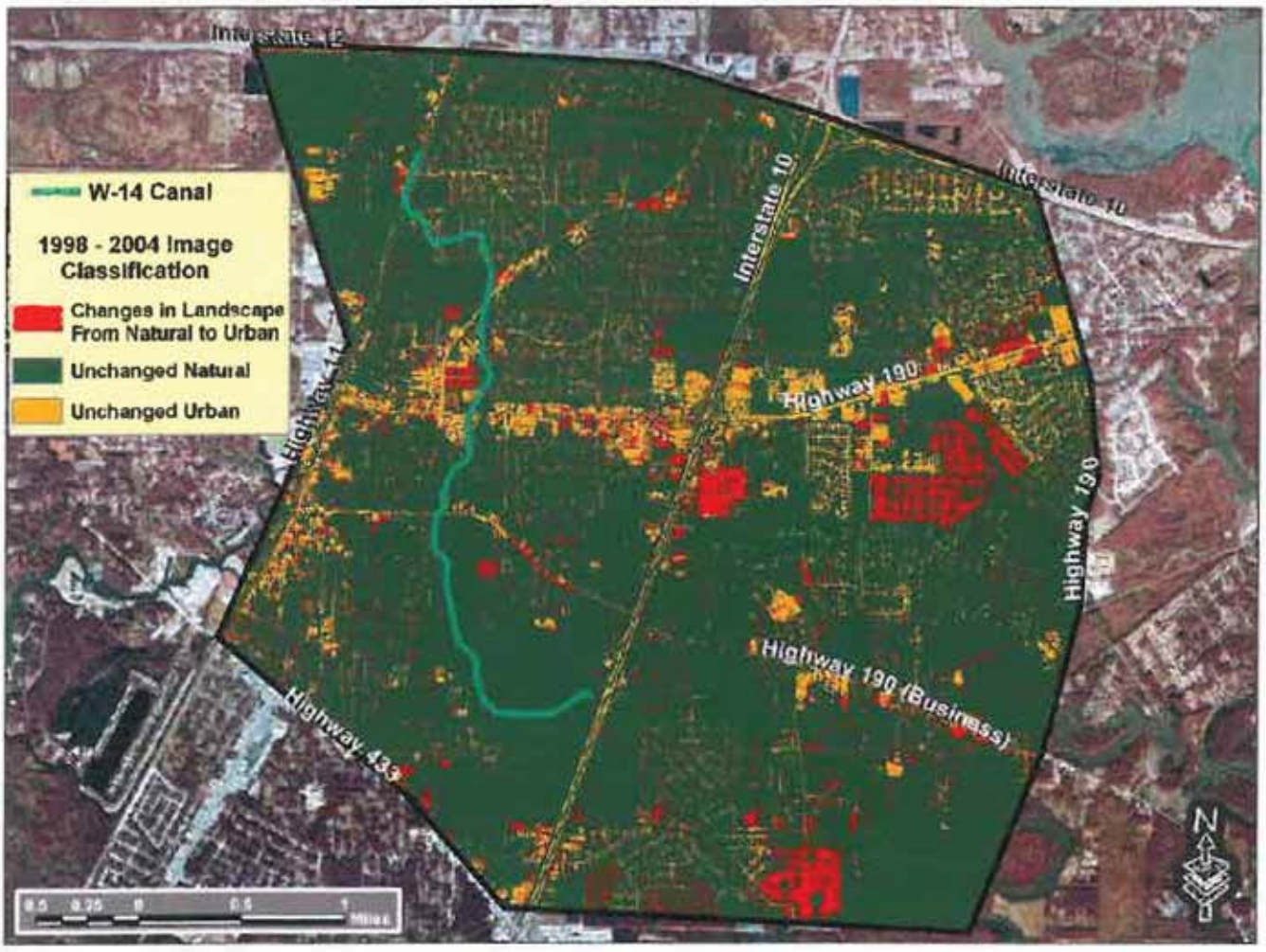


Figure 2. Developmental rate analysis area displayed on 2004 DOQQs.


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 floosplain 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

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# APPENDIX A

HABITAT ANALYSIS PROJECT INFORMATION SHEETS FOR W-14 CANAL

## SUMMARY WORKSHEET

**Mitigation Summary Worksheet For Permit Application #** 0
**Mitigation will be performed at:** (No Bank Selected)
**AND/OR Mitigation will be site specific and performed at:** 0

1. Impacts to be Mitigated

| Credits | Acres |
|---|---|
| 148.5 | 19.3 |

2. Out of Basin Factor

| | Required | Value |
|---|---|---|
| Project-Specific Mitigation | No | 1 |
| Bank | 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 × 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<br>2.4 | Enhancement I<br>2.4 | Enhancement I<br>2.4 | Enhancement I<br>2.4 | (Select an Option)<br>0 |
| | Maintenance/ Management Requirement | Active Vegetative Manipulation<br>0.8 | Active Vegetative Manipulation<br>0.8 | Active Vegetative Manipulation<br>0.8 | Active Vegetative Manipulation<br>0.8 | (Select an Option)<br>0 |
| Negative Influences on the mitigation site | Commercial/Residential<br>Development<br>Oil & gas activities<br>Size<br>Utility Corridors<br>Transportation | <br>No Impact<br>No Impact<br>area >500 acres<br>No Impact<br>No Impact<br>0 | <br>No Impact<br>No Impact<br>area >500 acres<br>No Impact<br>No Impact<br>0 | <br>No Impact<br>No Impact<br>area >500 acres<br>No Impact<br>No Impact<br>0 | <br>No Impact<br>No Impact<br>area >500 acres<br>No Impact<br>Slight<br>-0.1 | <br>No Impact<br>No Impact<br>area >500 acres<br>No Impact<br>No Impact<br>0 |
| | Control | Transfer Fee Title Con<br>0.6 | Transfer Fee Title Con<br>0.6 | Transfer Fee Title Con<br>0.6 | Transfer Fee Title Con<br>0.6 | (Select an Option)<br>0 |
| | Temporal Lag | 0 to 5<br>0 | 0 to 5<br>0 | 10 to 20<br>-0.2 | 0 to 5<br>0 | (Select an Option)<br>0 |
| | Credit Schedule | Schedule 3<br>0.2 | Schedule 3<br>0.2 | Schedule 3<br>0.2 | Schedule 3<br>0.2 | (Select an Option)<br>0 |
| | Kind | Category 1<br>0.4 | Category 1<br>0.4 | Category 1<br>0.4 | Category 1<br>0.4 | (Select an Option)<br>0 |
| | Location Relative to Impact | Zone 2<br>0.3 | Zone 2<br>0.3 | Zone 2<br>0.3 | Zone 2<br>0.3 | (Select an Option)<br>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 |
| Acreage 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 × 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 ≥ 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 Brnach 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 ≥ 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 $\geq$ 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.

# PINE-SAVANNAH RESTORATION PLAN
# For the SLIDELL W-14 CANAL PROJECT
# SEA #409A

## 1. Mitigation Goals and Objectives

The goal is to restore, maintain, and preserve the increasingly rare and ecologically significant longleaf pine savannah habitat on 46 acres adjacent to Big Branch Marsh National Wildlife Refuge (NWR) in St. Tammany Parish, Louisiana. Southern pine savannahs and open woodlands once dominated the southeastern United States, and may have totaled over 200 million acres at the time of European colonization (Conner *et al*. 2001). Longleaf pine communities characterized the Atlantic and Gulf coastal regions, and covered an estimated 60 to 92 million acres (Wahlenburg 1946, Frost 1993, Ware *et al*. 1993, Landers *et al*. 1995). Today, longleaf forests have declined to less than 3 million acres (Landers *et al*. 1995), of which approximately 3 percent remains in relatively natural condition (Frost 1993).

Southern pine forests today are very different from precolonial communities in extent, species composition, age, and structure (Ware *et al*. 1993, Noel *et al*. 1998). Original pine forests were old, open, and contained a structure of two layers (canopy and diverse herbaceous groundcover); these forests were dominated by longleaf pine in the coastal plain. In contrast, much of today's forest is young, dense, and dominated by loblolly pine, with a substantial hardwood component and little or no herbaceous groundcover (Ware *et al*. 1993, Noel *et al*. 1998). Drainages, however, with associated shrub and midstory layers and hardwoods, are integral components of the southern pine ecosystem and thus, should be managed throughout the landscape, as appropriate.

Little old growth remains, and virtually no longleaf forest has escaped changes in the natural fire regime (Simberloff 1993, Walker 1999). Precolonial fire frequencies in the southeast have been estimated at 1 to 3 years for the lower Gulf coastal plains (Stout and Marion 1993, Ware *et al*. 1993, Frost 1998). Active fire suppression began to be institutionalized in the southeastern United States between 1910 and 1930 (Frost 1993, Ware *et al*. 1993). Such fire suppression has severe and numerous impacts on southern pine ecosystems, including changes in tree species composition and forest structure. Longleaf pine cannot reproduce without access to the mineral soil, and will be replaced under fire suppression by other species of pines and hardwoods. The structure of the forest changes from two layers (a canopy and a diverse groundcover) to a multilayered midstory and canopy with little or no groundcover.

## 2. Location

As there were insufficient pine-savannah mitigation bank credits available, a mitigation plan centered on land acquisition and rehabilitation of that property was required to meet project mitigation requirements. The proposed 46-acre mitigation area occurs on four tracts (i.e., the Blossman #1, Blossman #2, Elmwood, and a portion of the Mentab tract) which are adjacent to the Big Branch Marsh NWR, St. Tammany Parish, Louisiana (Township 8 South, Range 12 East, Sections 35 and 48; Township 9 South, Range 12 East, Section 2; and Township 9 South, Range

13 East, Section 10, 40, and 41). All of the proposed sites are within the acquisition boundary of the Big Branch NWR, who would accept and manage the properties with conservation easements in place.

**3. Existing Conditions**

The Modified Charleston Method was used to evaluate the forest composition and condition of the sites under consideration for mitigation. The 52-acre Blossman #1 tract is currently comprised of a slash/loblolly pine stand with a herbaceous understory and sparse midstory due to frequent fire. It is estimated it would take no more than 5 years to return to pine savannah function because large pine trees currently exist on site. A hardwood drain is present and Chinese tallow trees are found intermittently throughout the site. The 41.6-acre Blossman #2 tract is currently comprised of an immature stand of slash/loblolly pine after having been logged approximately 15 years ago. It would take 10-20 years to replace pine/savannah functions on this tract than other tracts. This site is also bisected by a slough which would have more bottomland hardwood species in the immediate vicinity. The 36-acre Elmwood tract is comprised of longleaf, loblolly, and slash pine stand, and would take 0-5 years to return to pine savannah function because large pine trees currently exist on site. A portion of the tract contains a herbaceous understory with sparse midstory while other areas contain a moderate hardwood midstory approximately 5-10 feet in height. Chinese tallow trees are found intermittently throughout the site. The 322-acre Mentab tract (of which 33.5 acres is included in the subject mitigation proposal) was clearcut approximately 12 years ago and subsequently bedded and replanted with loblolly pine. Because large pine trees currently exist on the tract, it is estimated that it would take a reduced time (0-5 years) for this tract to replace pine/savannah function.

Existing drains, dams, plowed fire lanes and other surface feature alterations (i.e., bedding, disking, logging ruts or placement of fill) on tracts to be planted would be degraded prior to planting so as to restore natural surface contours to the maximum extent practicable. Resultant ground surface elevations would be made conducive to the establishment and support of wetland vegetation.

Drainage and roadside ditches which enhance the removal of water from planted tracts would be plugged, backfilled, or otherwise made ineffective. Roadways that are to be maintained for access would be culverted as needed to insure that surface flow is not impeded and minimizing dam reservoirs and/or reservoir shadows. Structures installed for the purposes of restoring natural hydrology would be maintained in good repair and would be functional at all times.

Monitoring the response of pine flatwood/savannah to restoration and management actions (including appropriate fire management), would be necessary to ensure the success of the mitigation project. The non-federal sponsor would acquire data in years 1,3, 5, and every 5th year thereafter following implementation of initial restorative actions and submit collected data to the CEMVN Environmental Branch. Following collection of suitable baseline data, elements to be reviewed during the 5 year period are basic hydrologic information, longleaf pine seedling survival data, and vegetation composition and structure (including overstory species per percent cover, midstory woody composition per percent cover, and groundcover composition per percent cover). Progress will be measured by the restoration criteria as listed below:

1. Survival of planted bare root longleaf pine seedlings shall not be less than 30 percent of the initial number of seedlings planted at year 3.

2. In the first three years of establishing the mitigation project, site hydrology shall be restored if needed as follows:
    a) Percent of area affected by artificial drainage <10%
    b) Percent of area affected by incoming surface flow <20%
    c) Percent of area affected by unnatural surface alterations 25%

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**4. Habitat to be Rehabilitated: Pine Savannah Long-Term Criteria**

Vegetative cover for high quality restored pine flatwood /wetland savannah will fall within the following ranges:

| Vegetation Strata | Estimated Total Percent Cover |
|---|---|
| Longleaf/Slash pine* overstory | 10 – 50 % |
| Total overstory (pine plus various hardwoods) | 15 – 55 % |
| Woody understory (shrub/small trees) | 5 – 15 % |
| Herbaceous ground cover** | 90 – 100 % |
| (* longleaf pine indicated by soil type and topography) | |
| (** sampled at least 12 months following a burn) | |

Vegetation composition should consist of a variety of indigenous species, with a predominance of longleaf or Slash pine in the overstory, and additional age classes of longleaf/Slash pine in the understory. Negative indicator species (NIS) will be maintained at a minimum level. A small number of indigenous hardwood shrub and tree species is desirable for wildlife diversity, and undoubtedly occurred on the pre-settlement landscape. General goals are as follows:

| Vegetation Composition | Species/type Composition |
|---|---|
| Overstory (> 15 ft ht) | 70– 90%* longleaf/slash pine |
| Understory (2 – 15 ft ht) | >50%* longleaf/slash pine; 4 species of indigenous shrubs/hardwood trees in pine flatwood wetlands |

The objective of the site restoration is to have 10-50 percent overstory of preferably longleaf pine trees, from 5-15 percent woody understory, and 90-100 percent herbaceous groundcover to

include grasses, sedges, and forbs. Present habitat on the site consists of scattered overstory slash and loblolly pines, midstory hardwoods, and midstory loblolly and slash pine throughout the tract. Some areas contain midstory hardwoods, others contain midstory pines, and others have minimal midstory and no overstory.

The strategy to accomplish the above objective is to remove Chinese tallow trees through the use of chemicals; remove midstory hardwoods and midstory loblolly pine in areas where they occur in abundance on the tracts through shearing, drum chopping, or alternate means without moving the soil. No wind rowing would take place. Vegetation would be lopped in place with the drum chopper. Sheared vegetation would be allowed to fall to either side of the bulldozer, allowing for tree planting access. As waters of the United States, wetlands within the mitigation site would be subject to all applicable requirements established under the Clean Water Act.

Prescribed burn to prepare the site for longleaf planting
A prescribed burn may be utilized prior to planting of longleaf pines. The prescribed burn would facilitate planting of the longleaf by removing slash from the shearing or drum chopping. A fireline no more than 10 feet wide along the perimeter of the tract acres would be applied. The fireline would be applied with the use of the blade of a bulldozer, drum chopper, or other means to minimize soil disturbance. The operator would attempt to remove the vegetation above ground by scraping brush, grasses, and fine fuels from the surface. If roots of larger plants become uprooted while pushing the fireline, the operator would attempt to replace the uprooted soil in its original location to the degree possible with the equipment on site.

Containerized longleaf seedlings would be planted during the dormant season (December 15 to March 15), at a density of 302 trees per acre. The objective of the planting is to have survival of at least 30 percent of the seedlings after three years of planting.

**5. Rehabilitation Work Plan**

1. Fire Management Regime.
Restoration of the site to pine flatwoods, savannahs and associated habitats depends upon the reestablishment of the natural frequency and seasonality of fire. Historically, most wildfires occurred during the growing season, which in Louisiana is generally considered to be late March to late October, with the majority of fires concentrated between 15 April and 15 June. Growing season burns will be favored over dormant season burns, however initial burning may be necessary during the dormant season to establish control of the shrub and woody layers. Burn frequency will be approximately every 2 - 3 years, commencing in the spring after mitigation site acquisition. Heavily fire suppressed sites may require burns on a more frequent basis to reduce the midstory/understory hardwood and shrub component. In the pine flatwood/savannah sections, burns will be conducted at a frequency to ensure that there will be no more than 40% woody vegetation cover in the shrub stratum at year 3 and no more than 30% woody vegetation cover in the shrub stratum at year 5. Natural or existing firebreaks will be utilized whenever possible to reduce unnatural disturbances to the site and allow burning in large blocks which mimics natural fire behavior. No ditching, bedding, plowed fire lines or other soil disturbance within seeps, wetlands/uplands interface or adjacent areas will be constructed so natural water flow patterns remain unaltered. A state certified burn manager will conduct all prescribed burns and everyone on the fire crew should have a Red Card.

2. Supplemental Vegetative Plantings.
Longleaf pine seedlings, preferably obtained from local seed sources, will be planted in native savannah areas determined to be deficient of natural longleaf pine regeneration following the initial prescribed burn of the site. Seedlings will be planted in variable sized and shaped patches and/or cohorts with seedlings spaced approximately 5 feet apart within patches/cohorts that are spaced at least 50 feet apart. Intensity of plantings will be determined by optimal longleaf overstory coverage of 10 to 50 percent. During the grass-stage the growing tip (bud) of the tree is protected under a thick arrangement of needles at ground level. When fires sweep through, the needles may burn but the tip of the bud remains protected. New needles quickly replace those that were burned off. During the grass-stage, longleaf pine seedlings are virtually immune to fire. At this stage, although the tree will not be growing upwards, the seedling will be putting down an impressive root system underground. As planted longleaf seedlings begin to enter the bottlebrush stage, fire regime will be altered, especially in those planted cohort areas, to avoid loss due to fire. At this stage of growth, longleaf pine trees are slightly more vulnerable to fire. It may take a year or so before the bark thickens enough to withstand most fires. The longleaf may remain in this stage for a couple of years.

3. Restoring Site Hydrology.
Prior to the first burn and planting of the site, existing plowed fire breaks will be graded and filled to natural elevations prior to planting. Additionally, all roadside berms that are aligned perpendicular to natural sheet flow will be returned to natural grade to restore hydrology.

4. Control of Undesirable/Exotic Species.
Undesirable tree species that are not common to longleaf pine flatwood/savannah forests and are not removed through the burning process will be manually removed, felled and left on site or killed via select use of stem-applied herbicides. Should the non-Federal sponsor decide to remove undesirable tree species by logging, they must make a written request to CEMVN providing documentation as to the effects the timbering activity would have on community structure, ecosystem health, wildlife, aesthetics and fire fuel availability. In no case will timber from the savannah areas be removed without prior review and approval by CEMVN. Appropriate actions as necessary to remove exotic animals, such as feral hogs, will be taken when their numbers cause serious damage. Also, cattle grazing will be prohibited at all times. The mitigation sites will be monitored, managed and protected as described elsewhere in this agreement.

**6. Performance Standards**

To be used to compensate for unavoidable impacts to pine flatwoods/savannah and related habitats, the sites must be shown to progress from their current state (as described in the baseline conditions) towards an open, highly species diverse pine flatwood/savannah ecosystem with isolated insolated pockets of wetlands. Elements that can be measured to show this progression include basic hydrologic information, longleaf pine seedling survival and growth data, vegetation composition and structure (including overstory species per percent cover, midstory woody composition per percent cover, and groundcover composition per percent cover). The positive and negative herbaceous indicator species identified in the Ecological Value Assessment for longleaf pine savannahs can also be used to measure successful management; reflected by an

increase in the diversity of positive species versus the reduction in the number of negative species. The control of woody shrubs and hardwood encroachment or lack of encroachment into savannah areas can be used to measure the success of management in moving the site to a high quality ecosystem. The following criteria use these elements to measure success:

a) Initial Success Criteria (Year 1)

1. Floristic survey of current site conditions completed.
2. During the dry season, non-indigenous hardwood overstory species within the savannah areas will be removed to a level below 10% canopy coverage and nonindigenous pine species will be thinned to below 40% canopy coverage.
3. Controlled burns must have occurred throughout the site including along the margins any wetlands.
4. All work necessary to restore hydrology to the site must be complete prior to vegetative plantings. At a minimum, prior to planting, all earthen work must be completed.
5. Long leaf pine plantings have occurred at an initial density of 300 trees per acre using cohorts of 25 trees per cohort and follows the planting regime described in the site restoration plan.
6. Long-leaf seedlings will have a survival rate of at least 30% (100 trees per acre)

b) Interim Success Criteria (Year 3)

1. Plant survivorship must be 60 stems per acre or greater in the bottle brush and/or more progressed stage. Most planted seedlings should be progressing from the grass stage to bottlebrush stage.
2. Plant composition of pine flatwoods/savannah and related habitats. Vegetative monitoring data should indicate that: (1) the diversity of positive indicator species has been increased (on the average, more than 14 positive species present), (2) negative indicator species have become less prominent (on the average, less than 1 negative species present) and (3) woody shrub height and density are managed appropriately by habitat type.
3. Prescribed burns have occurred at least twice throughout the pine flatwood/savannah habitat and at least once along the margins of the wetlands.

c) Long-term Success Criteria (Year 5 and beyond)

1. Vegetative cover for high quality rehabilitated longleaf pine flatwood wetland savannah will fall within the following ranges:

| Vegetation Strata | Estimated Total Percent Cover |
|---|---|
| Longleaf pine overstory | 10-50% |
| Total overstory (longleaf pine plus various hardwoods) | 15-55% |
| Woody understory (shrubs/small trees) | 5-15% |
| Herbaceous groundcover sampled at least 12 months following a burn | 90-100% |

2. Pine flatwoods/savanna vegetation composition should consist of a variety of indigenous species, with a predominance of longleaf pine in the overstory, and

additional age classes of longleaf pine in the understory. Negative indicator species (NIS) will be maintained at a minimum level. A small number of indigenous hardwood shrub and tree species is desirable for wildlife diversity, and undoubtedly occurred on the pre-settlement landscape. General goals are as follows:

| Vegetation Composition | Species/Type Composition |
|---|---|
| Overstory (> 15 ft. ht.) | 70 – 90 % * longleaf pine |
| Understory ( 2 – 15 ft. ht.) | > 50 % * longleaf pine; 4 species of indigenous shrubs/hardwood trees in pine flatwood wetlands |
| Herbaceous groundcover (< 2 ft.) | 50 – 90 % * grasses / sedges 10 – 50 % * forbs; > 10 native species / meter square; > 50 herbaceous species / site; NIS species < 1%* |
| *percent of total cover of designated strata | |

3. Fire Management. Prescribed burns throughout the pine flatwood/savannah habitat as well as along the margins of any wetlands have occurred at a frequency of once every 2-3 years.

**7. Monitoring Plan and Reporting**

Monitoring will be performed during the spring. The sponsor will provide to the CEMVN Environmental Compliance Branch reports for all monitoring events by June 1 of each monitoring year. Reports will be submitted as follows:
baseline data (prior to beginning site restoration and prior to or within one year of authorizing credit sales), a planting and hydrologic restoration report (upon completion of the work; may be included with the baseline if occurring in the same year), an initial success criteria report (three years after planting), an interim success criteria report (two years after successfully meeting the initial success criteria). Long-term success criteria reports (five years after successfully meeting the interim success criteria and every fifth year thereafter). The report will include a summary of where, when and percent coverage of burns that have occurred since the previous monitoring report. Data collected for initial, interim and long-term monitoring will be the same as for baseline conditions using the same sample plots.

a) <u>Establishment of permanent monitoring plots and Vegetation Monitoring Data reporting:</u>

1. The mitigation site would be divided into relatively homogenous habitat or management units to account for habitat types present and areas with management histories that are significantly different from each other. Such units would be considered unique if they are greater than 50 acres in size. Each management unit would be sampled to determine current baseline levels for restoration criteria.

2. 3-5 line intercept transects would be systematically distributed within each management unit. Transects would be a minimum of 500 meters in length and 1-meter square intercepts would be established at 20 meter intervals along the transects and sampled for data collection as described below under "1 meter square plot size". At three equal distant intervals 100 meter square intercepts would be established and sampled for data collection as described below under "100 meter square plot size". Plot size and data to be collected from plots are listed below. Additional plant species noted outside sample plots would be recorded to obtain a total species list for the site. Cover will be determined from sample plots as follows:

| Plot Size | Strata | Data Collected |
|---|---|---|
| 1 meter square | Groundcover (all herbs; woody plants <2 ft.) | a) Species present<br>b) Cover by species<br>c) Total cover all species<br>d) Total cover NIS*<br>e) Total number all species (excluding NIS)<br>f) Percent cover rasses/sedges (excluding NIS)<br>g) Percent cover forbs (excluding NIS) |
| 100 meter square | Understory (woody plants 2-15 ft tall) | a) Species present<br>b) Cover by species<br>c) Total cover all species<br>d) Total cover NIS |
| | Overstory (>15 ft.) | a) Species present<br>b) Cover by species<br>c) Total cover all species<br>d) Total cover NIS |
| | Groundcover (<2 ft.) | Additional species not found in meter square plot |
| *Negative Indicator Species | | |
| Cover Classes: <1%; 1-5%; 5-10%; 10-25%; 25-50%; 50-75%; 75-95%; >95% | | |

3. At least four permanent photo points would be established and photos taken in years 1, 3 and 5.

4. Longleaf pine seedlings would be planted in variable sized and shaped patches/cohorts with seedlings spaced approximately 5 feet apart within the patches/cohorts which should be spaced at least 50 feet apart. Intensity of plantings would be determined by optimal longleaf overstory coverge of 10 to 50 percent. Average survival rates would be determined for planted longleaf pine seedlings by surveying a representative sample of patches/cohorts at 3 years following initial planting. The approximate center-point of each

patch/cohort would be marked in the field to facilitate relocation and subsequent survey.

5. No timbering of longleaf pine is allowed unless monitoring demonstrates that stand density has unacceptably reduced ground cover of the savannah area.

6. The NFS, or their assigns, would utilize available data and exercise best professional judgment in estimating the percent area negatively effected by artificial drainage (*e.g.*, canals and ditches) as well as the percent area impacted by surface feature alterations (e.g., bedding, chopping, plowed rows and/or fire breaks, rutting, dozing, road embankments, disking and other sources of fill placement) following remedial measures to correct these alterations.

b) Baseline Data Report: In order to demonstrate site rehabilitation through management, the sponsor will perform a Floristic Survey using an acknowledged scientific methodology and collect Vegetative Monitoring data (Section 7.a) from the permanent plots prior to performing any site management. This baseline data will be collected at each sample plot. In addition, the sponsor will provide a report detailing the hydrologic disturbances that need attention and provide a work plan identifying work necessary to accomplish hydrologic restoration.

c) Fire Management Reporting: For each burn event, the following information will be reported: date of burn, percent coverage of the site burned, percent coverage by species for various vegetative strata, species composition, and a map showing the location of the area burned (if the percentage of the site burned is less than 100%).

d) Initial Success Criteria Report: To be submitted following the end of the first year after planting seedlings.

1. Planting Restoration information will be reported and will include the following: source of the seedlings; areas planted; the number of seedlings planted; a map showing the location and identity of each cohort; and a table showing data on the size of each cohort and the number of seedlings planted by cohort. In addition, the center point of each cohort will be permanently marked and GPS coordinates will be provided in the table.
   Hydrologic Restoration information will be reported and will include the following: date(s) of activities documentation (fire break and road side berm restoration which will be returned to natural grade) demonstrating unimpeded sheet flow.

2. Vegetation Monitoring data (Section 7.a) will be provided. In addition, documentation will be provided on the success of the plantings and the percentage of seedling survival. This vegetative monitoring data will be compared to baseline data to demonstrate rehabilitation and/or maintenance of the pine flatwoods/savanna and related habitats.

3. Should this report indicate that the initial success criteria were not attained; the report will include an Adaptive Management Plan (Section 9) and that indicates what is determined to be the problem(s) and a plan of action on solving the problems.

e) Interim Success Criteria Report: To be submitted following the end of the third year after the planting of seedlings.

1. Should the Initial Success Criteria Report indicate that management has been effective and initial success criteria are achieved, this report will document attainment of the interim success criteria as described in Section 6.b. Vegetation Monitoring data (Section 7.a) will be provided. In addition, documentation will be provided on the success of the plantings and the percentage of seedling survival. This vegetative monitoring data will be compared to baseline data to demonstrate rehabilitation and/or maintenance of the pine flatwoods/savannah and related habitats.

2. Fire Management Reports (see Section 8.c) will be provided for each burn event.

3. Hydrologic Restoration information will be reported and will include the following: photographic documentation (fire break and road side berm restoration) demonstrating unimpeded sheet flow and documentation that shows the bank site meets the wetland criterion for site vegetation, soils and hydrology as described in the1987 Wetlands Manual.

4. Should information in this report indicate that the interim success criteria were not attained, report will include an Adaptive Management Plan (Section 9) should be submitted to CEMVN. This plan should identify and describe the problem(s) and provide a plan of action on solving these problems.

f) Long Term Monitoring Reports:

1. Should the Interim Success Criteria report indicate that management has been effective and interim success criteria are achieved, a Long Term Success Criteria Report showing Vegetative Monitoring data (Section 7.a) will be submitted every five years thereafter documenting the results of the monitoring. This vegetative monitoring data will be compared to baseline data to demonstrate rehabilitation and/or maintenance of the pine flatwoods/savannah and related habitats.

2. Fire Management Reports (Section 7.c) will be provided to CEMVN for each burn event.

3. Should information in any of these reports indicate that the long-term success criteria are not attained, an Adaptive Management Plan (Section 9) should be submitted to CEMVN. This plan should identify and describe the problem(s) and provide a plan of action on solving these problems.

**8. Long-Term Maintenance and Protection**

The non-Federal sponsor will be responsible for maintaining and protecting lands contained within the mitigation site in perpetuity. The non-Federal sponsor will be required to place a conservation servitude over the property and that conservation servitude will incorporate this Pine-Savannah Restoration Plan by reference. A copy of the conservation servitude to be filed in the Conveyance records of the parish in which the site is located will be provided to CEMVN for review and approval prior to filing. After filing, a copy of the recorded conservation servitude, clearly showing the book, page and date of filing, will be provided to CEMVN.

a) Uses Prohibited by the Conservation Servitude

1. Placing, filling, storing, or dumping of refuse, trash, vehicle bodies or parts, rubbish, debris, junk, waste, or other such items on the Property.

2. Mechanized land clearing or deposition of soil, shell, rock or other fill on the Property without written authorization from CEMVN.

3. Cutting, removal or destruction of vegetation on the property except in accordance with the non-Federal Sponsor's timber management plan and/or in accordance with any permits authorized by the Corps of Engineers at the time the cutting is proposed. Timber harvests/thinning will only be approved if the Corps determines that such activities are needed to maintain or enhance the ecological value of the site.

4. Grazing of cattle or other livestock on the property.

5. Commercial, industrial, agricultural, or residential uses of the Property without prior approval from the Corps.

6. Dredging, draining, ditching, damming or in any way altering the hydrology of the Property except as required or permitted by this Pine-Savannah Restoration Plan.

7. All other activities, which the Corps determines to be inconsistent with the establishment, maintenance and protection of wetlands within this Pine-Savannah Restoration Plan and that may or may not be subject to Corps of Engineers regulatory authority.

b) Uses Allowed By the Conservation Servitude. No other human activities that result in the material degradation of habitat within the lands covered by this Savannah-Pine Restoration Plan will occur. The conservation servitude will not prohibit, subject to appropriate regulatory authority, the following activities:

1. Monitoring of vegetation, soils and water;

2. Hunting and fishing, and non-consumptive recreational uses such as hiking and bird watching;

3. Ecological education;

4. Sub-surface exploration and production of minerals;

5. Provision of rights-of-way;

6. Compliance with Federal regulations or appropriate court orders.

**9. Adaptive Management Plan**

In the event reports in Section 7 submitted to CEMVN reveals that any success criteria have not been met, the non-Federal sponsor, or their assigns, will take all necessary measures to modify management practices in order to achieve these criteria in the future. If survival is less than 30 percent of the initial number of seedlings planted three years after planting or 25 percent of the initial number of seedlings planted between five and seven years reports after planting, as determined by sampling or by observing high mortality at any location within the planted tract, the non-Federal sponsor, or their assigns, will take appropriate actions to address the causes of mortality and replace all dead seedlings with new seedlings during the following non-growing season.

In the event that the hydrology has not been restored to the site, an evaluation will be performed to determine the additional hydrological work needed to restore the hydrology. If success was not obtained due to loss of seedlings, the cause of the seedling loss will be documented; should the loss be due to too intense of a burning program, the report will document a potential plan for altering the prescribed fire regime to reduce future loss; if the loss is due to disease, the report will document that supplemental planting material will be obtained from a different source. Following the review of the report, the sponsor will perform the list of corrective actions approved by CEMVN. After managing the site for up to two years, the non-Federal sponsor, or their assigns, will provide a subsequent report documenting that success criteria have now been met.

**10. Financial Assurances**

The purposes of financial assurances are twofold: (1) to ensure that sufficient funds are available for performance of the ecologic restoration of the site or acquisition of similar or preferable ecological value in the case of site failure, and (2) to provide a source of funding for the perpetual maintenance of the site. To accomplish these goals, sufficient funds to perform the restoration work must be ensured and a Long-Term Management Fund established.

The costs for monitoring and for operation and maintenance of the mitigation project are estimated to be $63,475. This estimate for operation and maintenance costs is based on a reduced scope of work for the project and the reduced mitigation requirements. The breakdown of costs are described below. This estimate includes management in perpetuity.

| | |
|---|---|
| Hardwood midstory removal and | $ 5,400 |

| | |
|---|---|
| periodic control of exotic species | |
| Maintenance of prescribed burning program | $ 14,375 |
| Environmental monitoring (including hydrological maps, plot sampling and analysis) | $ 30,000 |
| Salary expense (preparation of refuge management plans, fire management plans, compatibility determinations, and Section 7 Endangered Species Consultation) | $ 10,000 |
| Post boundary signs protecting the area | $ 600 |
| Provide law enforcement | $ 3,100 |

The Coastal Protection and Restoration Authority of Louisiana (CPRA) is expected to serve as the non-federal sponsor for the Slidell W-14 Drainage Canal Improvements project, including the required mitigation, as described in Environmental Assessment #409. At such time as a project partnership agreement is executed for construction of the project, the CPRA would self-certify its ability to provide the required funding.

In the event that the non-Federal sponsor is unable to meet its financial commitment to the mitigation project, the CEMVN would assume responsibility for monitoring, operation, and maintenance, subject to the availability of additional appropriations.

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# Primary Sponsor Letter of Support

(As uploaded)

## 533D Report W14 Support Letter.pdf

ST. TAMMANY PARISH
PATRICIA P. BRISTER
PARISH PRESIDENT

September 9, 2016

**Re: Project for Modifications to W-14 Canal 533D Report (2012)**

Dear Sir/Madam:

On behalf of St. Tammany Parish, I am pleased to submit the 533D Report-W14 Modifications project for consideration under WRRDA and hereby request funding assistance from United States Army Corps of Engineers.

The 533D Report modifications project presents the results of the latest modeling and hydrologic data with recommendations to the project set forth in the Corps' W-14 533D report published in 2012.

Implementing the project as recommended in the modified report will improve flood protection for the W-14 Canal basin. The recommended modifications are needed in order to provide the much needed reduction in flood risk for the benefit area in and around the W-14 Canal.

Sincerely,

Patricia P. Brister

Patricia P. Brister
Parish President

OFFICE OF THE PARISH PRESIDENT
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