US Army Corps of Engineers
Vicksburg District

DRAFT

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
NEW ORLEANS TO VENICE
FEDERAL HURRICANE PROTECTION LEVEE
PLAQUEMINES PARISH, LOUISIANA

Prepared for:
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March 2011

DRAFT

Supplemental Environmental Impact Statement
New Orleans to Venice
Federal Hurricane Protection Levee
Plaquemines Parish, Louisiana

US Army Corps of Engineers®

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SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
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U.S. ARMY CORPS OF ENGINEERS, VICKSBURG DISTRICT

The responsible lead agencies are the United States (U.S.) Army Corps of Engineers, Vicksburg and New Orleans Districts. The Non-Federal sponsors for the project are the Louisiana Coastal Protection and Restoration Authority and Plaquemines Parish. The U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Natural Resources Conservation Service, Louisiana Department of Wildlife and Fisheries, Louisiana Department of Natural Resources, and Louisiana Department of Environmental Quality are important coordination partners with planning responsibilities for the natural resources component of the project, including wetlands, essential fish habitat, and threatened and endangered species.

ABSTRACT:

The New Orleans to Venice (NOV) Federal levee project is located in Plaquemines Parish, in southeastern Louisiana, along the Mississippi River corridor and includes restoring, armoring, and accelerated completion of the existing Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice to provide the authorized design grade for storm risk reduction. The elevations of the existing floodwalls and levees are below the authorized NOV design elevation. The NOV Federal levee project would restore the elevation of the levees on the east bank from Phoenix to Bohemia and the levees on the west bank from St. Jude to Venice to meet the authorized 2% design grade. A total of 2 miles of the Mississippi River Levee (MRL) between river mile (RM) 46.5 to RM 44 have an average deficiency of 0.4 feet. The two miles of the MRL that are deficient need to be raised to meet MRL authorized grade prior to the NOV Federal levee project; however, the schedule for execution of this MRL work is subject to congressional appropriation. The project to address deficiencies in the MRL levee would be constructed and funded through the Mississippi River and Tributaries (MR&T) program prior to construction of the NOV Federal levee project and a separate NEPA analysis would document the impacts to the environment.

The project was initially authorized in the Flood Control Act of 1962. Prior to the landfall of Hurricane Katrina in August of 2005, the NOV levee project was approximately 85% complete with an estimated completion date of September 2018. After 2005, the NOV project was funded at $769 million in the Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006 (3rd Supplemental); Emergency Supplemental Appropriations Act for Defense; the Global War on Terror, and Hurricane Recovery, 2006 (4th Supplemental); Supplemental Appropriations Act, 2008 (6th Supplemental); and Supplemental Appropriations Act, 2009 (7th Supplemental) passed by Congress. The funding provided for repair work, restoration of the project to the authorized grade, acceleration of the project, and armoring of critical project elements.

Alternatives considered included restoring the elevation of Federal levees to meet the 50-year (2%) level of risk reduction, which is the tentatively selected plan (TSP), and restoring the elevation of levees to meet the Authorized Pre-Katrina General Design Memorandum (GDM) level of risk reduction. A No Action alternative was also considered. This SEIS evaluates the effects that each alternative has on the project area's significant resources. The currently estimated fully funded cost of the TSP, including mitigation, is anticipated to fall between $857 and $1,286 million.

Send your comments to the District Engineer by 08 May 2011. If you would like further information on this statement, please contact:

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SECTION 1.
SUMMARY

1. SUMMARY

Major Conclusions and Findings

1.1 This Draft Supplemental Environmental Impact Statement (SEIS), is being prepared by the U.S. Army Corps of Engineers (USACE) to evaluate the potential impacts associated with the New Orleans to Venice (NOV) hurricane risk reduction levee project located along the Mississippi River corridor in Plaquemines Parish, Louisiana (Figure 1-1). The project includes restoring, armoring, and accelerating the completion of the existing NOV Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice. This SEIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's Regulations (40 Code of Federal Regulations [CFR] 1500-1508), as reflected in the U.S. Army Corps of Engineers' Engineering Regulation (ER) 200-2-2.

1.2 Following Hurricanes Katrina and Rita in 2005, which caused major destruction and damage to the levee system in southeast Louisiana, Congress provided funding for the restoration, armoring, and accelerated completion of the NOV Federal levee through several emergency supplemental appropriation acts. This funding allowed for repair work, restoration of the project to the authorized grade, acceleration of the project, and armoring of critical project elements.

1.3 The purpose of the project is to provide the authorized design-grade level of storm risk reduction for Plaquemines Parish, Louisiana. The Proposed Action would restore the elevation of NOV flood risk reduction structures (a total length of 90 miles) to meet authorized design grade, and stabilize those sections of levees where subsoil deficiencies or internal levee deficiencies undermine their strength. The project is divided into 14 levee sections, and in most levee sections, this would involve elevating the levee crest with earthen fill and expanding the levee base footprint to provide the necessary design strength. The addition of earthen fill and expansion of the levee base would be the most likely method to stabilize subsoil sections of levees requiring additional strength. In some cases, floodwalls, including concrete T-walls, would be restored on top of some levees where design and cost factors dictate.

RATIONALE FOR DESIGNATION OF SELECTED PLAN

1.4 The decision on the Proposed Action was the result of a collaborative planning effort with Federal, state, and local agencies, and the public. A range of reasonable alternatives was formulated through input by the USACE, New Orleans District (CEMVN) and USACE, Vicksburg District (CEMVK) Project Delivery Team, Value Engineering Team, engineering and design consultants, as well as local government, the public, and resource agencies for each section described in this SEIS. Once a full range of alternatives was established for each reach, a preliminary screening was conducted to identify which alternatives would proceed through further analysis. The alternatives evaluated in this SEIS are as follows:

Figure 1-1: Vicinity Map

GSRC

December 2010

- Alternative 1: No Action Alternative;
- Alternative 2: 50-year (2%) Level of Risk Reduction; this is also the tentatively selected plan (TSP); and
- Alternative 3: Authorized Pre-Katrina General Design Memorandum (GDM) Level of Risk Reduction

1.5 The TSP was chosen during an evaluation process in which the objectives of the project were assessed, which included minimizing impacts on the human community and valuable environmental resources, maximizing levee system reliability, and maximizing cost and project schedule.

CONSTRUCTION

1.6 Proposed total construction time for all the NOV levee sections is estimated to be 600 days from mobilization to completion of construction. The NOV Federal levee sections would be initiated subsequent to initiation of the first non-Federal levee (NFL) section. The NFL sections would be replaced and modified for incorporation in the NOV Federal levee system. The NFL sections have been covered by a separate environmental analysis and are not part of this project. The first NOV levee contracts are proposed to be awarded in April 2012, and the completion is proposed for 2015. Temporary easements would be utilized for access and staging areas; however, acquisition would be perpetual levee easement/servitude for the levees and associated structures that are under construction.

1.7 Borrow material would need to be acquired for the NOV levee projects. Approximately 22,946,000 cubic yards of non-compacted clay would be required to restore, armor, and accelerate completion of the entire NOV levee system to the 2% level of risk reduction. Borrow material is normally government-furnished (GF), which is acquired by the government from a willing landowner through a real estate transaction. However, alternative methods of securing borrow can be utilized when found to be in the best interest of the government for a particular contract. A borrow analysis would be completed. If the borrow analysis determines that requiring the construction contractor to furnish its own borrow material (contractor-furnished (CF) borrow) is in the best interest of the government, then the contractor has the burden of establishing that the CF borrow is geotechnically suitable and from a site that has been environmentally cleared. The proposed CF borrow would be evaluated via the appropriate NEPA documentation.

1.8 The NEPA coordination of the impacts for potential borrow sources has been previously documented under several Individual Environmental Reports (IER), including IERs for GF (18, 22, 25, and 28) and IERS for CF (19, 23, 26, 29, 30, 31, and 32). Impacts associated with these IERs are compiled and summarized in Section 6. All borrow IERs are posted on www.nolaenvironmental.gov. Prior to any borrow acquisition, the USACE would review the existing environmental documentation to ascertain if additional impact analyses or agency coordination would be necessary. If so, USACE would produce an updated environmental assessment for that particular borrow area.

REAL ESTATE ACQUISITION

1.9 The responsibility for providing privately owned lands, easements, rights-of-way (ROW), relocations, and disposal areas (LERRD) required for the project purposes is the responsibility of the Federal government.

SECTION 404 FINDINGS

1.10 As required by Section 404(b)(1) of the Clean Water Act, an evaluation to assess the impacts associated with the discharge of dredged and fill materials into Waters of the U.S. (WUS) will be prepared for the TSP. Full compensatory mitigation would be provided for the unavoidable adverse impacts on wetlands as a result of the project. No threatened or endangered species or designated critical habitat would be adversely affected by the TSP.

FINDINGS ON EXECUTIVE ORDER 11988, FLOODPLAIN MANAGEMENT

1.11 Executive Order (EO) 11988 requires that Federal agencies proposing activities in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternatives exist to siting an action in a floodplain, the action must be designed to minimize potential harm to or within the floodplain. The TSP involves construction within the base (100-year) floodplain. All alternatives considered, including alternatives eliminated from detailed consideration in this SEIS, would be located within the base floodplain. No non-floodplain alternatives exist. The floodplain in the area of the TSP is developed for residential, commercial, and industrial purposes. The levee systems and gated structures provide risk reduction from hurricane and Mississippi River flooding, and all protected areas are managed through forced drainage by pumping to remove excess rainwater. The TSP is needed to provide flood risk reduction to the area and no practicable alternatives exist. The TSP would be designed to minimize adverse impacts and is consistent with the requirements of EO 11988.

FINDINGS ON EXECUTIVE ORDER 11990, PROTECTION OF WETLANDS

1.12 EO 11990 directs Federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practical alternative exists. The justification and mitigation for all impacts on WUS, including wetlands and other waters, involves first trying to avoid impacts on the resource, secondly minimizing impacts on the resource, and thirdly providing compensatory mitigation for all unavoidable impacts on WUS, including wetlands and other waters. Avoidance is determined first by demonstrating that the proposed project is water-dependent, and secondly by demonstrating that the proposed project is the least environmentally damaging practicable alternative. Since the purpose and need is to develop an effective hurricane risk reduction levee in Plaquemines Parish, Louisiana, impacts on WUS, other waters, and wetlands would be unavoidable. The TSP is the least environmentally damaging practicable alternative and is consistent with the requirements of EO 11990. The temporary and permanent impacts on wetlands would be fully compensated and mitigated for by restoring wetlands. The U.S. Fish and Wildlife Service (USFWS) has identified priority areas for potential mitigation sites along the west and east sides of the Mississippi River that generally

characterize potential lines of defense along the flood-side of the NOV and Plaquemines Parish NFL projects. Ideally, the fresh/intermediate marsh and brackish marsh mitigation sites would occur on the east bank of the Mississippi River, and the saline marsh mitigation sites would be located on the west bank of the Mississippi River. Bottomland hardwood (BLH) mitigation sites would likely occur within the same watershed as the impacted habitat, to the extent practicable.

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

1.13 Potential impacts on minority and economically disadvantaged people in the vicinity of the NOV project area have been taken into consideration. Most of the NOV levee project corridor is considered to be an area where environmental justice issues could be present, and there would likely be short-term moderate disproportionate impacts on individuals in the project area. Transportation for individuals without vehicles could be temporarily impacted during levee restoration and construction. If minority or low-income individuals' homes are purchased or displaced and they have to relocate, there could be permanent, major impacts on low-income or minority populations. However, there would be long-term beneficial impacts on minority and low-income individuals with the increased flood risk reduction.

FINDINGS ON EXECUTIVE ORDER 13112, INVASIVE SPECIES

1.14 During the implementation of the TSP, it is possible that, in the short-term, site preparation and construction disturbances could cause temporary adverse impacts through increased spread and propagation of viable seed sources of non-native and invasive species within and near the project area. Re-vegetating the disturbed areas with native species after project construction is complete would likely limit the spread of non-native and invasive plant species.

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

1.15 A Phase I Environmental Site Assessment was conducted in July 2010 on behalf of USACE for the entire NOV Federal levee project corridor by Quaternary Resource Investigations, LLC in accordance with American Society for Testing and Materials (ASTM) standard ASTM E1527-05. The Phase I Environmental Site Assessment documented the Recognized Environmental Conditions for the project area. The probability of encountering hazardous, toxic, and radioactive waste (HTRW) in the course of the NOV levee project would be low, and direct significant adverse impacts would not be anticipated.

Areas of Controversy

1.16 No significant areas of controversy were identified during the planning stages of this project. There were some concerns expressed at the public scoping meetings held on 12 September, 2009, 03 November, 2009, and 08 December, 2009. The most numerous concerns expressed by meeting participants regarded the delay in the NOV Federal levee project schedule due to environmental concerns, the level of hurricane risk reduction in Plaquemines Parish, and mitigation costs. The public scoping report can be found in Appendix I of this SEIS.

Unresolved Issues

1.17 Based on the availability of funds, the possibility exists that some of the levee sections may proceed through the design stage only. It is unknown at this time how the levee restorations, armoring, and accelerated completion would proceed in that case. The source of all borrow material is currently not known. The borrow site would meet USACE prioritization for borrow site selection, which includes avoiding sites containing wetlands.

Relationship of Alternatives to Environmental Requirements

1.18 The NOV Federal levee project requires compliance with the Federal regulations and EOs/memoranda presented in Table 1-1. The project would be considered in partial compliance (PC) for each statute or EO until the requirements are met. Once the requirements are met, the project would achieve full compliance (FC). No decision will be made or Record of Decision signed until full environmental compliance is achieved.

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

Federal Statutes	Alternative 1: No Action Alternative	Alternative 2: (TSP): 50-year (2%) level of risk reduction	Alternative 3: Authorized Pre-Katrina (GDM) level of risk reduction	Borrow Areas
1. Clean Air Act, as Amended. Compliance requires coordination with the U.S. Environmental Protection Agency (USEPA) and analysis of potential impacts on air quality. Coordination of SEIS by USEPA and Louisiana Department of Environmental Quality (LDEQ) would bring project into full compliance.	FC	PC	PC	PC
2. Clean Water Act of 1977. Compliance requires preparation of 404(b)(1) Evaluation and submission of such to Congress with the SEIS. Issuance of water quality certification and National Pollutant Discharge Elimination System permit by LDEQ would bring project into full compliance.	FC	PC	PC	PC
3. Coastal Zone Management Act of 1972 and Louisiana State & Local Coastal Resources Act of 1978. Compliance requires coordination with the Louisiana Department of Natural Resources (LDNR). Full compliance after consistency review by LDNR. See Appendix D for Coastal Zone Consistency Determination letter.	FC	PC	PC	PC
4. Endangered Species Act of 1973, as Amended. Compliance requires coordination with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to determine if any endangered or threatened species or their critical habitat would be impacted by the project. See Appendix C for USFWS Concurrence.	FC	PC	PC	PC
5. Federal Water Project Recreation Act. Compliance requires review by the U.S. Department of the Interior. Washington-level review of the SEIS will bring the project into full compliance.	FC	PC	PC	PC
6. Fish and Wildlife Coordination Act. Compliance requires coordination with the USFWS and the Louisiana Department of Wildlife and Fisheries. See Appendix G for Fish and Wildlife Coordination Act Report.	FC	FC	FC	PC

Table 1-1, continued

Federal Statutes	Alternative 1: No Action Alternative	Alternative 2: (TSP): 50-year (2%) level of risk reduction	Alternative 3: Authorized Pre-Katrina (GDM) level of risk reduction	Borrow Areas
7. Land and Water Conservation Fund Act (LWCFA). Compliance requires Secretary of the Interior approval of replacement property that would be acquired to mitigate converted property purchased with LWCFA funds.	NA	NA	NA	PC
8. Archaeological and Historic Preservation Act of 1974. Compliance requires USACE to undertake recovery, protection, and preservation of significant cultural resources whenever its activities may cause irreparable loss or destruction of such resources. Full compliance would be achieved with State Historic Preservation Office (SHPO) concurrence.	FC	PC	PC	PC
9. National Historic Preservation Act. Compliance requires USACE to take into account the impacts of project on any property included in or eligible for inclusion in the National Register of Historic Places. Full compliance would be achieved with SHPO concurrence.	FC	PC	PC	PC
10. National Environmental Policy Act of 1969, as Amended. Compliance requires preparation of this SEIS, consideration of public comments, and preparation and public review of the final SEIS. Signing of the Record of Decision would bring this project into full compliance.	FC	PC	PC	PC
11. River and Harbor Act. No requirements for USACE projects authorized by Congress. Navigable waters would not be obstructed.	FC	FC	FC	PC
12. Farmland Protection Policy Act. Compliance requires coordination with the Natural Resources Conservation Service to determine if any designated prime or unique farmlands are affected by the project.	FC	PC	PC	PC
13. Watershed Protection and Flood Prevention Act. No requirements for USACE projects.	NA	NA	NA	NA

Table 1-1, continued

Federal Statutes	Alternative 1: No Action Alternative	Alternative 2: (TSP): 50-year (2%) level of risk reduction	Alternative 3: Authorized Pre-Katrina (GDM) level of risk reduction	Borrow Areas
14. Wild and Scenic River Act. Compliance requires coordination with Department of the Interior to determine if any designated or potential wild, scenic, or recreational rivers are affected by the project. There are no such rivers in the project area.	NA	NA	NA	PC
15. Magnuson-Stevens Fishery Management Act Essential Fish Habitat assessment is included in this SEIS. Full compliance will be achieved after review of the SEIS by NMFS.	FC	PC	PC	PC
16. Fishery Conservation and Management Act Full compliance will be achieved after review of the SEIS by NMFS.	FC	PC	PC	PC
17. Migratory Bird Treaty Act and Migratory Bird Conservation Act The potential for migratory birds to use the project area is high, as the adjacent marshes attract several migratory birds and nesting activity is common. See Appendix G for Fish and Wildlife Coordination Act Report.	FC	PC	PC	PC
18. Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act, Toxic Substances Control Act of 1976. An HTRW assessment has been performed to identify sites of concern in the project area and vicinity. (See Appendix H)	FC	FC	FC	PC

Table 1-1, continued

EO /Memoranda	Alternative 1: No Action Alternative	Alternative 2 (TSP): 50-year (2%) level of risk reduction	Alternative 3: Authorized Pre-Katrina (GDM) level of risk reduction	Borrow Areas
1. EO 11988, Floodplain Management. Compliance requires an assessment and evaluation together with the other general implementation procedures to be incorporated into the SEIS.	FC	FC	FC	PC
2. EO 11990, Protection of Wetlands. Compliance requires that the results of analysis and findings related to wetlands be incorporated into the SEIS.	FC	FC	FC	PC
3. Executive Memorandum, Analysis of Impacts on Prime and Unique Farmlands in EIS. Compliance requires inclusion of effects of Proposed Action on prime and unique farmlands in SEIS.	FC	PC	PC	PC
4. EO 11593, Protection and Enhancement of the Cultural Environment. Compliance requires USACE to administer cultural properties under their control in stewardship for future generations; preserve, restore or maintain such for benefit of the people; and assure that its plans contribute to preservation and enhancement of non-Federally owned sites.	FC	FC	FC	PC
5. EO 13112, Invasive Species. Compliance requires assessment of potential for the project to introduce invasive species to the project area.	FC	FC	FC	PC
6. EO 12898, Environmental Justice in Minority and Low-income Populations. Compliance requires assessment of project effects on minority and low-income populations.	FC	FC	FC	PC

FC - In Full Compliance
PC - In Partial Compliance
NA - Not Applicable

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3. NEED FOR AND OBJECTIVES OF ACTIONS

3.1 The United States (U.S.) Army Corps of Engineers (USACE), Vicksburg District (CEMVK), is preparing a Supplemental Environmental Impact Statement (SEIS) to evaluate the potential impacts associated with the proposed hurricane risk reduction levee project in Plaquemines Parish, Louisiana. The project area for the Proposed Action is located along the Mississippi River corridor in Plaquemines Parish, Louisiana (Figure 1-1). The project includes restoring, armoring, and accelerated completion of the existing NOV Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice to provide the authorized design grade for storm risk reduction. This SEIS is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council of Environmental Quality's Regulations (40 Code of Federal Regulations [CFR] 1500-1508), as reflected in the USACE's Engineering Regulation (ER) 200-2-2.

3.2 The purpose of the Proposed Action is to provide the authorized design-grade level of storm risk reduction for Plaquemines Parish. The elevations of the existing floodwalls and levees are below the authorized NOV design elevation. The NOV Federal levee project would restore the elevation of the levees on the east bank from Phoenix to Bohemia and the levees on the west bank from St. Jude to Venice to meet the authorized 2% design grade. A total of 2 miles of the Mississippi River Levee (MRL) between river mile (RM) 46.5 to RM 44 have an average deficiency of 0.4 feet. The two miles of the MRL that are deficient need to be raised to meet MRL authorized grade prior to the NOV Federal levee project; however, the schedule for execution of this MRL work is subject to congressional appropriation. The project to address deficiencies in the MRL levee would be constructed and funded through the Mississippi River and Tributaries (MR&T) program prior to construction of the NOV Federal levee project and a separate NEPA analysis will document the impacts to the environment.

3.3 The Proposed Action is needed to reduce risk to residences, businesses, and other infrastructure from storm-induced and wave-driven storm events in the Gulf of Mexico and high water events in the Mississippi River.

Project Authority

3.4 The project was initially authorized in the Flood Control Act of 1962 (Public Law [P.L.] 87-874) as the Mississippi River Delta and below New Orleans, Louisiana Flood Control Project. The project subsequently became known as the New Orleans to Venice (NOV) Hurricane Protection Project.

3.5 Prior to the landfall of Hurricane Katrina in 2005, the NOV project was approximately 85% complete with an estimated completion date of September 2018. Funding constraints slowed work and extended the completion date. Since that time, USACE has repaired most of the damages caused by Hurricane Katrina.

3.6 In the aftermath of the 2005 hurricane season, the NOV project was funded at $769 million in the Department of Defense, Emergency Supplemental Appropriations to Address

Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006 (3rd Supplemental), Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (4th Supplemental), Supplemental Appropriations Act, 2008 (6th Supplemental), and Supplemental Appropriations Act, 2009 (7th Supplemental) passed by Congress. The funding in these acts provided for repair work, restoration of the project to the authorized grade, acceleration of completion of unconstructed portions of the project, and armoring of critical project elements. Slight deviations from the original alignment of the project are anticipated in order to assure that soil stability conforms to adopted Hurricane and Storm Damage Risk Reduction System (HSDRRS) standards.

3.7 Pre-Katrina, the USACE was authorized to reduce the risk of flood inundation from a design hurricane with a radius of 30 nautical miles, a wind velocity of 100 miles per hour, a central pressure of 27.6 inches, and a forward speed of 5 to 11 knots. This was documented in New Orleans to Venice, Louisiana Design Memorandum No. 1, as supplemented, a General Design Memorandum (GDM) which was used as a basis for construction prior to the 2005 hurricane season. Elevations for the system were developed through modeling of the design hurricane on several potential tracks that could affect the project area. Following Hurricane Katrina, updated hurricane models were developed and used to recalculate the effects of storm events for the Greater New Orleans Area. A subset of these storms was used to reassess the level of risk reduction provided by the NOV levee project. The GDM elevations were found to represent various storm event frequencies, depending on the location; however, they generally fell near the 2% or 50-year level of risk reduction based on the updated hurricane models. A consistent level of risk reduction at the 2% frequency was therefore used as the basis for moving forward with the authorized project as funded. Upon completion, this project will achieve storm risk reduction for Plaquemines Parish at the authorized (2%) level.

Public Concerns

3.8 The greatest area of public concern is related to the importance of providing hurricane, storm, and flood damage risk reduction for businesses and residences, and providing for public safety during major storm events. Hurricane Katrina forced most Plaquemines Parish residents from their homes and, due to extensive flooding, made returning to their homes in a timely manner unsafe. There were numerous concerns expressed at the public scoping meetings held on 12 September 2009, 03 November 2009, and 08 December 2009, regarding the delay in the NOV Federal levee project schedule due to environmental concerns, the level of hurricane risk reduction in Plaquemines Parish, and mitigation costs. The public scoping report can be found in Appendix I of this SEIS.

Prior Reports

3.9 Information and data on existing floodwall and levee conditions were derived from the following reports associated with the Proposed Action, and are incorporated herein by reference:

- 1974, Final EIS, New Orleans to Venice, Louisiana Hurricane Protection, U.S. Army Engineer District New Orleans. This document discussed the enlargement of the west bank back levee from City Price to Venice (Reaches A, B1 and B2) and construction of a

new levee from Phoenix to Bohemia on the east bank of the Mississippi River (Reach C). Barrier levees from Bohemia to 10 miles above Head of Passes on the east bank and Fort Jackson to Venice on the west bank were also discussed in the EIS (USACE 1974) (Figure 3-1).

- 1985, Final Supplement I to the EIS, New Orleans to Venice Hurricane Protection Project. This document discussed the deficiencies of the 1974 Final EIS and also the enlargement of the locally constructed west bank back levee from City Price to Venice, Reaches A (City Price to Tropical Bend), B1 (Tropical Bend to Fort Jackson), and B2 (Fort Jackson to Venice) (USACE 1985a).

- 1985, Mitigation Report, New Orleans to Venice Hurricane Protection Project. This document discussed the mitigation for the levees from Tropical Bend to Venice – Reaches B1 and B2 (USACE 1985b). Mitigation was accomplished with the creation of 300 acres of marsh in the Delta National Wildlife Refuge by breaching the existing Main Pass bank resulting in accretion of marsh by natural deposition of sediments.

- 1987, Final Supplement II to the EIS, New Orleans to Venice Hurricane Protection Project. This document discussed additional impacts for the east bank (Reach C) and west bank MRL. The east bank barrier levee (1974 EIS, from Bohemia to 10 miles above Head of Passes) was dropped from further consideration (USACE 1987).

- 1996, Mitigation Report, New Orleans to Venice Hurricane Protection Project. This document is the final mitigation report prepared for the New Orleans to Venice Hurricane Project. This mitigation report discussed additional mitigation needs as the result of constructing the West Bank MRL, East Bank Back Levee (Reach C), and West Bank Back Levee (Reach A) (USACE 1996). Mitigation was accomplished by creating and preserving 1,072 acres of marsh on the Pass a Loutre State Wildlife Management Area (WMA) in the Mississippi River Delta.

Planning Objectives

3.10 Developed portions of Plaquemines Parish are located within the area protected by the levee system in a confined corridor parallel to the Mississippi River, bounded on all sides by levees.

3.11 The Proposed Action would increase the elevation of the NOV Federal levees to meet the NOV authorized design grade of 2% and stabilize those sections of levees where subsoil deficiencies or internal levee deficiencies undermine their strength. In most levee sections, this would involve elevating the levee crest with earthen fill and expanding the levee base footprint to provide the necessary design strength. The addition of earthen fill and expansion of the levee base would be the most likely method to stabilize subsoil sections of levees requiring additional strength.

Figure 3-1: Reaches from Original 1974, 1985 and 1987 EISs

GSRC

January 2011

3.12 In some cases, floodwalls would be used in order to meet the authorized design grade. Floodwalls are concrete and steel walls, built on top of an existing levee, or in place of a levee, often where space is insufficient for an earthen levee's broad base. For the NOV levee project, concrete T-walls would be repaired or replaced on top of some levees where design and cost factors dictate.

3.13 The Proposed Action also includes raising and stabilizing existing pump station walls and gates to meet the authorized design criteria (Photograph 3-1). Floodgates and sector gates would be used which would require possible dredging and pile driving. Floodgates are gates on land that provide access through levees or floodwalls. Sector gates are floodgates that are used on a waterway and allow continued navigation (Photograph 3-2). The sector gates remain open until a storm approaches and have the ability to hold back higher water from either direction.

Photograph 3-1. Example of a pump station

Photograph 3-2. Example of a sector gate

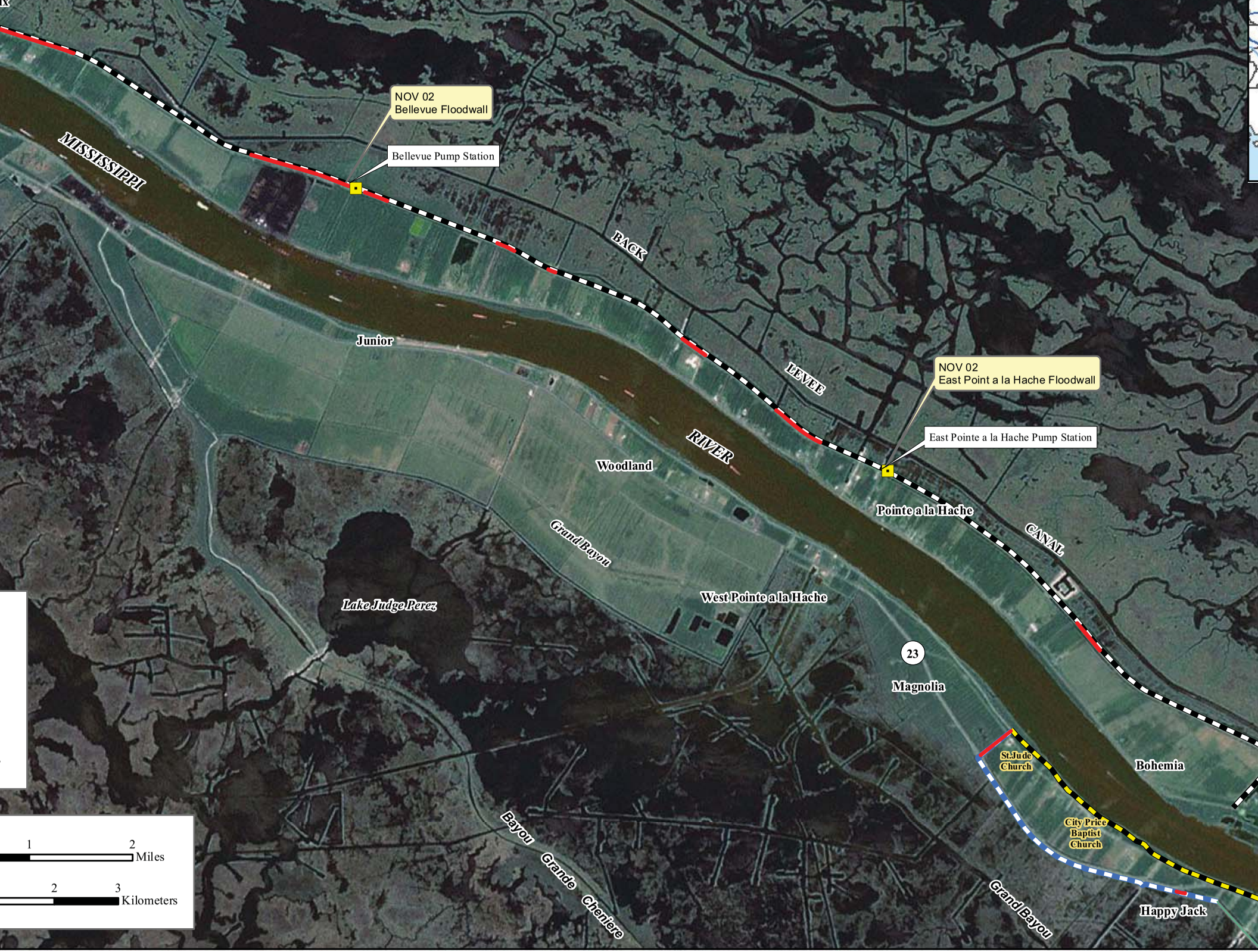
3.14 Where restoring the levee by raising the elevation to meet authorized design grades would require fill outside of the existing ROW, additional ROW would be acquired. Louisiana Highway (LA) 23, local parish roads, and open water canals and lakes, as well as sensitive wetland habitats, are the primary ROW considerations that would constrict expansion of existing levee footprints.

3.15 The Proposed Action is divided into 14 individual projects designed to be bid for contracts and constructed independently of each other. The project limits were defined by construction timing priority, similarity of the type of construction, equipment and logistics required for the project, and proximity of the project area to necessary supplies, such as suitable borrow material and project access routes.

3.16 The Proposed Action would apply to the following NOV levee project sections:

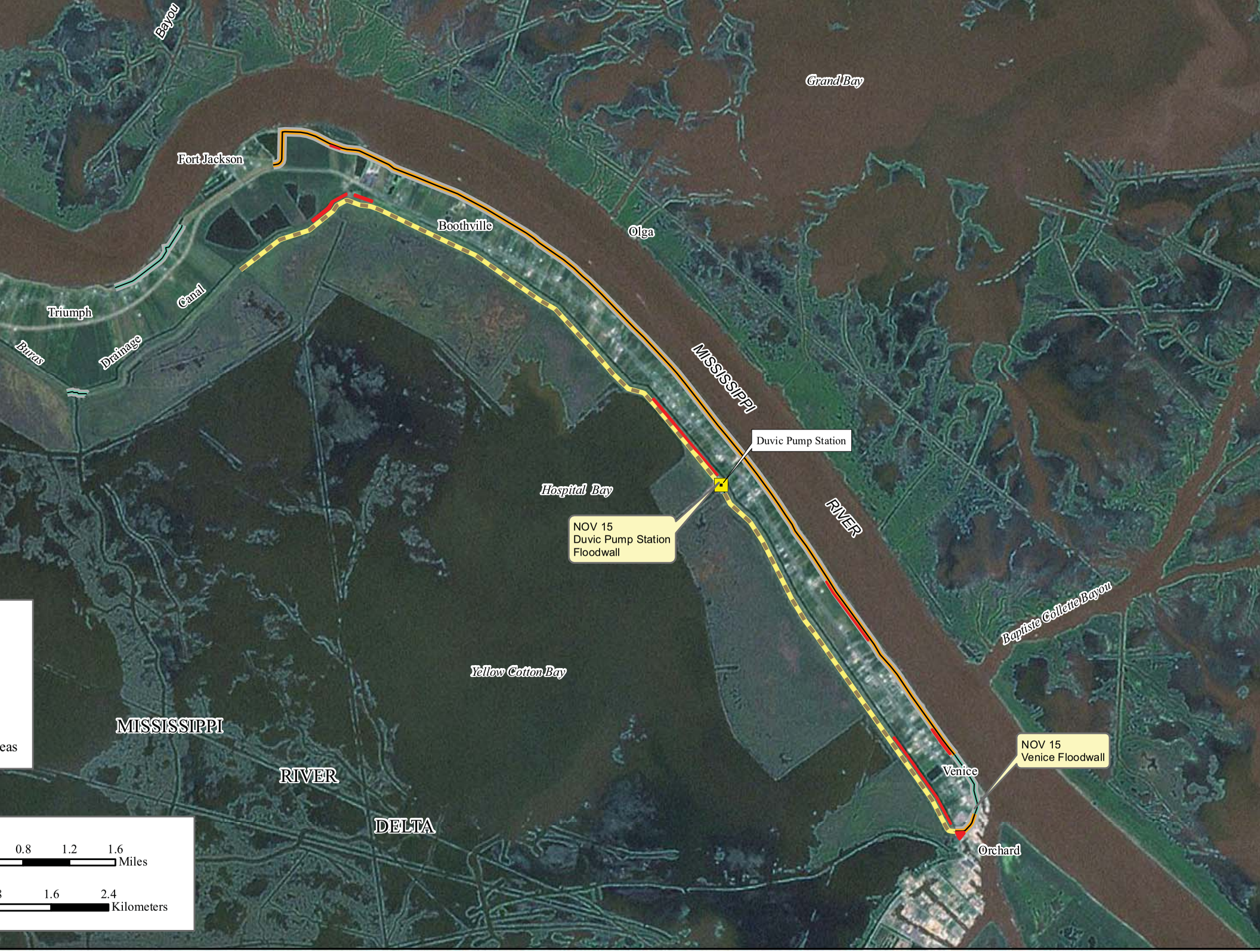
- NOV 01 – Back Levee, East Bank (Figure 3-2)
- NOV 02 – Back Levee, East Bank, frontage protection at two pump stations (Figure 3-2)
- NOV 05 – Back Levee, West Bank (Figure 3-2)
- NOV 06 – Back Levee, West Bank (Figure 3-3)
- NOV 07 – Back Levee, West Bank (Figure 3-4)

- NOV 08 – Back Levee, West Bank (Figure 3-5)
- NOV 09 – MRL, West Bank (Figure 3-2)
- NOV 10 – MRL, West Bank (Figure 3-3)
- NOV 11 – MRL, West Bank (Figure 3-4)
- NOV 12 – MRL, West Bank (Figure 3-5)
- NOV 13 – Back Levee, West Bank, Empire Lock floodgate/floodwalls (Figure 3-2)
- NOV 14 – MRL, West Bank, Empire Lock floodwall repairs (Figure 3-4)
- NOV 15 – MRL, West Bank, Point Michel, Childress and Venice floodwalls; Back Levee, West Bank, Grand DeLiard and Duvic Pump Station floodwalls
- NOV 16 – MRL, West Bank (Figure 3-4)


NOV 02
Bellevue Floodwall
Bellevue Pump Station
MISSISSIPPI
BACK
LEVEE
RIVER
CANAL
NOV 02
East Point a la Hache Floodwall
East Pointe a la Hache Pump Station
Junior
Woodland
Grand Bayou
Lake Judge Perez
West Pointe a la Hache
Pointe a la Hache
23
Magnolia
St.Jude Church
Bohemia
City Price Baptist Church
Happy Jack
Bayou Grande Chenere
Grand Bayou
1
2
Miles
2
3
Kilometers

WILDLIFE MANAGEMENT AREA
Happy Jack
California Bay
Long Bay
Grand Bayou
MISSISSIPPI
Port Sulphur
Cox Bay
Auguste Bay
Homeplace
Bay Lanaux
RIVER
Sixtymile Point
Bay de la Cheniere
Nairn
Grand Bayou
Point Pleasant
Tropical Bend
Areas
1
2
Miles
2
3
Kilometers

Nairn
Anderson Pass
Spanish Point
Sable Island
Point Pleasant
Big Pass
Raccoon Point
Bay Raccoon
Little Raccoon Point
NOV 14
Empire Lock Floodwall
Bosco Island
Empire
Bay Denesse
Adams Bay
MISSISSIPPI
Ostrica
NOV 15
Childress Floodwall
NOV 13
Empire Lock Floodwall
and Floodgates
Fort Jackson
Buras
RIVER
Triumph
Canal
Drainage
Buras
Bay Pomme d'Or
Grand De Liard Pump Station
NOV 15
Grand De Liard
Pump Station Floodwall
OV 14
as
1
2
Miles
2
3
Kilometers
Cyprien Bay


Bayou
Grand Bay
Fort Jackson
Boothville
Olga
Triumph
Canal
Buras
Drainage
MISSISSIPPI
Duvic Pump Station
Hospital Bay
RIVER
NOV 15
Duvic Pump Station
Floodwall
Baptiste Collette Bayou
Yellow Cotton Bay
MISSISSIPPI
RIVER
DELTA
Venice
NOV 15
Venice Floodwall
Orchard
0.8
1.2
1.6
Miles
1.6
2.4
Kilometers

SECTION 4.
ALTERNATIVES

4. ALTERNATIVES

Plans Considered in Preliminary Analysis

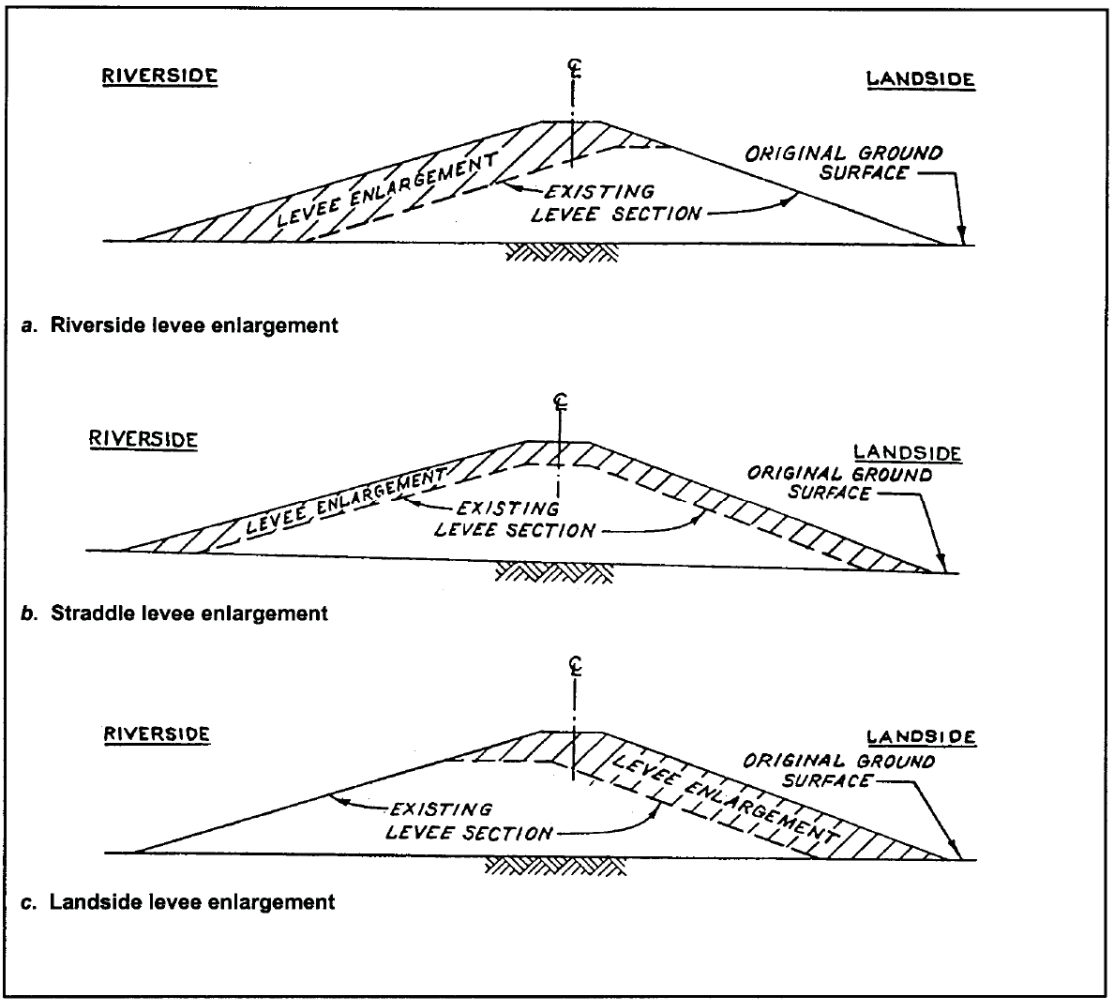
4.1 Key issues to be analyzed in the SEIS are the potential impacts on the human and natural environment resulting from the restoration, armoring, and accelerated completion of levees, floodwalls, and floodgates, to an elevation that meets the 50-year level of risk reduction. The SEIS would assist CEMVK in deciding among alternatives, how best to implement the TSP, and determining the need for any appropriate mitigation measures. 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 (WRDA) of 1974 (P.L. 93-251) requires USACE to give consideration to non-structural measures to reduce or prevent flood damage.

4.2 In addition to these mandated alternatives, a range of reasonable alternatives was formulated through input by the CEMVK/CEMVN Project Delivery Team, Value Engineering Team, engineering and design consultants, as well as local government, the public, and resource agencies for each reach described in this SEIS. The "action" alternatives formulated are comprised of alternative alignments for each levee corridor. Within each of these alignment alternatives, several scales were considered to encompass various flood risk reduction design alternatives which could be utilized within that alignment. The following standard set of alignment alternatives and alternative scales within these alignments were initially considered for each reach:

4.3 Alternative Alignments:

- Existing alignment (Diagram 4-1)
    - Flood Side ("Riverside") Shift - Construction involves placing enough fill material at the toe of the existing levee proceeding out into open water (or the flood side) with a "mud wave" until the desired ground surface elevation is achieved, and on the crown of the levee. All toe-to-toe growth occurs on the flood side of the existing levee. Often, a flood-side shift will impact wetlands or other aquatic and forested habitats (Diagram 4-1).
    - Protected Side ("Landside") Shift - Construction involves placing the fill material at the toe of the existing grade on the interior (protected side) of the levee until the desired ground surface elevation is achieved, and on the crown of the levee. All toe-to-toe growth occurs on the protected side of the existing levee. Often, a protected-side shift will impact public roads, personal residential or commercial property, or community resources such as parks.
    - Straddle - Construction involves increasing the levee section on the floodside, the protected side, and the crown of the levee.

- New levee alignment would consist of constructing a levee where there is currently no risk reduction feature.



Source: USACE 2000

Diagram 4-1. Types of Levee Enlargements

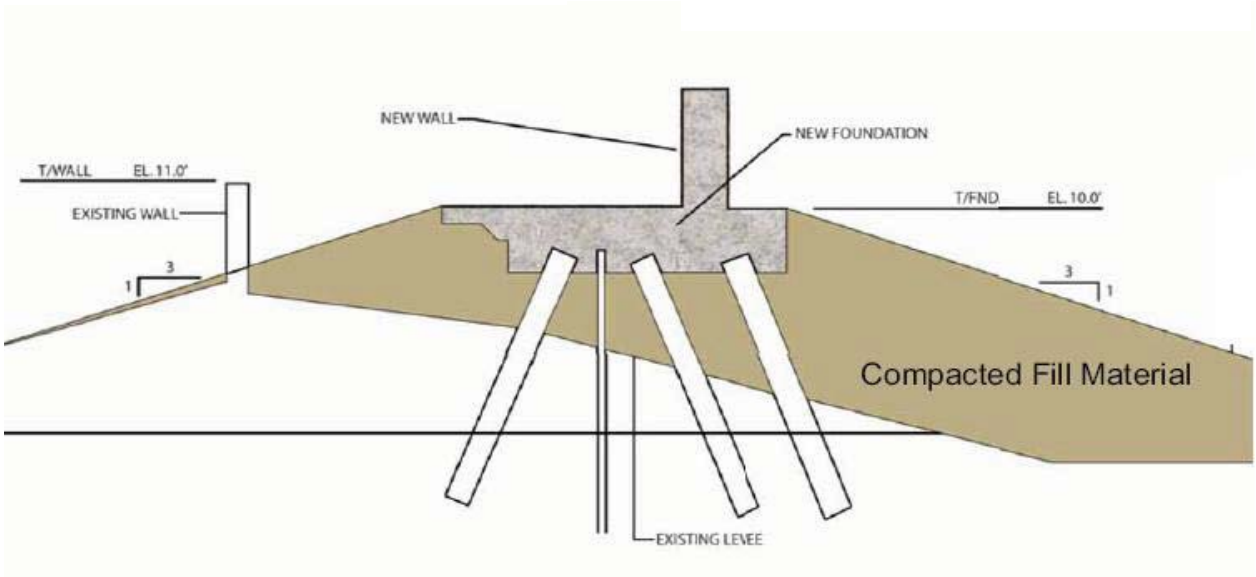
4.4 Alternative Scales:

- Earthen levee - Earthen levees are often the least costly alternative to risk reduction. They are usually planted with grass to protect the levee against erosion. Other armoring tactics include rip-rap and turf mats. Earthen levees are beneficial under relatively constant hydrostatic pressure and where the height of the water is not changing rapidly, as they are good at channeling and holding back water (Photograph 4-1).

- T-wall type floodwalls - T-walls are very strong alternatives, but are very expensive. They consist of a concrete stem and base slam (inverted T) that is inserted into the levee, and are fully reinforced to resist applied moments and shears. A steel sheet pile cutoff wall is cast into the base slab of the T-wall to resist under seepage during flood events. In some cases, it may be necessary to support the T-wall with steel or concrete pile foundation (Photograph 4-2 and Diagram 4-2).

Photograph 4-1. Example of Earthen Levee

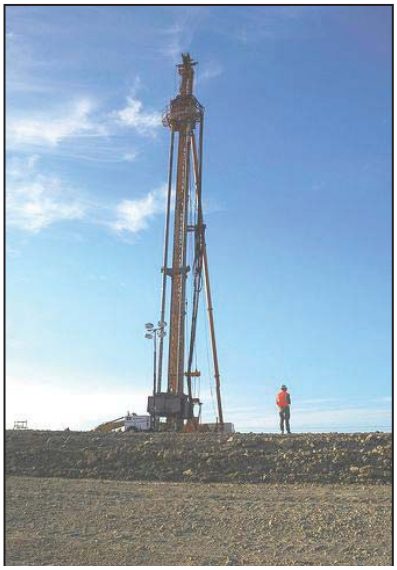
Photograph 4-2. Example of Earthen Levee and T-Wall



Source: USACE 2008c **Diagram 4-2. Diagram of a T-wall**

- Earthen levee using deep soil mixing – Deep soil mixing involves the injection and mixing of a concrete slurry into the underlying soil in order to strengthen the soil before raising the levee (Photograph 4-3).

- Non-structural flood risk reduction – These measure include increased floodplain and watershed management by avoiding actions located in or adversely affecting floodplains, buying out/relocating structures and homes located within a floodplain, and implementing flood warning and preparedness projects. In addition, non-structural flood risk reduction alternatives include the restoration of ecosystems and achieving compatible recreational areas in the floodplain (Buss 2005).



Photograph 4-3. Deep soil mixing equipment

4.5 Additionally, other alternatives were formulated to address reach-specific opportunities and constraints, all of which are described in detail in the following section. Once a full range of alternatives was established for each reach, a preliminary screening was conducted to identify which alternatives would proceed through further analysis. Criteria used to make this determination included engineering effectiveness, economic efficiency, and environmental and social acceptability. Those alternatives which did not adequately meet these criteria were considered infeasible and were eliminated from further study in this SEIS.

Plans Eliminated From Further Study

NON-STRUCTURAL ALTERNATIVE

4.6 Section 73 of the WRDA of 1974 requires that non-structural alternatives be evaluated in flood damage reduction studies. ER 1105-2-100 provides planning guidance on applicable non-structural measures. Non-structural flood damage reduction measures typically include permanent relocation, evacuation, or demolition of structures in the floodplain; flood-proofing of structures; flood warning systems; and regulation of floodplain uses. The average annual cost of implementing nonstructural measures such as flood-proofing by raising individual homes and businesses within Plaquemines Parish exceeded the amount allocated to this project. Other non-structural measures such as permanent relocation, demolition of inhabited structures, or regulation of floodplain use are not within the authority of CEMVK as provided by the Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act of 2006 (3rd Supplemental – P.L. 109-148, Chapter 3, Construction, and Flood Control and Coastal Emergencies). Additionally, flood warning systems and evacuation plans are already in place for all of Plaquemines Parish. Therefore, the non-structural alternative was eliminated from further consideration.

ALTERNATE (NEW) LEVEE LOCATION

4.7 The levee could be relocated to an area that would have less impact when levee footprint expansion would encroach on infrastructure or on sensitive habitats. This alternative would require acquisition of a large area of additional levee ROW from private landowners. Because the stability of existing levees is due in large part to the long-term compaction of subsoil under the levee footprints, moving the levee location would result in less levee stability, substantially longer construction times, increased costs, and greater risk of levee failure than restoration of the existing levees. The uncertainty associated with moving the existing levee footprints to avoid impacts cannot be properly evaluated, and the resulting risk would be contrary to the intent of Congress in appropriating funds to restore, armor, and accelerate completion of the affected levees to the authorized level of risk reduction. Therefore, a decision was made by USACE to stay along the existing alignment and restore, armor, and accelerate completion of the existing levee. Because of these reasons, this alternative was eliminated from further consideration.

Without Condition (No Federal Action)

ALTERNATIVE 1: NO ACTION ALTERNATIVE

4.8 The CEQ's regulations and USACE's procedures for implementing NEPA (ER 200-2-2) require that a No Action Alternative be evaluated. This alternative is the set of conditions that are expected to occur in the proposed project area in the absence of a project. Under the No Action Alternative, there would be no restoration, armoring or accelerated completion of any of the existing flood risk reduction structures within Plaquemines Parish instituted by the Federal government, and the authorized design flood risk reduction would not be provided within these levee sections.

Plans Considered in Detail

ALTERNATIVE 2 (TSP): 50-YEAR (2%) LEVEL OF RISK REDUCTION

4.9 The TSP would involve restoring the levee by elevating the levee crest with earthen fill and expanding the levee base footprint to provide the necessary design strength to meet the 50-year frequency level of risk reduction which reduces the chance of hurricane surge and wave-driven flooding in any given year to 2%. The addition of earthen fill and expansion of the levee base would be the most likely method to stabilize subsoil sections of levees requiring additional strength. Concrete T-walls would be restored on top of some levees where design and cost factors dictate. Existing pump station walls and gates would also be restored to meet the authorized design criteria. Where restoring the levee by raising the levee elevation to meet authorized design grades would require fill from outside of the existing ROW, additional ROW could be required. Corridor maps depicting the 2% level of risk reduction footprint can be found in Appendix A.

4.10 Each NOV levee project for the TSP is described in the sections below. All elevations are referenced to the North American Vertical Datum (NAVD) of 1988.

NOV 01

4.11 NOV 01 (Maps 1 to 38; Appendix A) consists of the back levee on the East Bank between Phoenix and Bohemia. The approximately 15.8-mile-long earthen levee is bounded on the west by LA 39 and on the east by a borrow ditch or open marsh lands. The existing grade is between 14 and 16.5 feet (ft). The TSP for NOV 01 would restore the earthen levee to the authorized design grade of 19.5 to 20.5 ft with additional fill material outside the existing ROW.

NOV 02

4.12 NOV 02 (Maps 11, 25; Appendix A) consists of providing accelerated completion of frontage protection for the Bellevue and the East Pointe á La Hache Pump Stations on the East Bank back levee. Work would equal 0.08 mile for the Bellevue floodwalls and 0.05 mile for the East Pointe á La Hache floodwalls.

NOV 05

4.13 NOV 05 (Maps 39 to 47; Appendix A) consists of 3.2 miles of back levee on the West Bank near City Price. The earthen levee is bounded on the east by LA 23 and on the west by marsh and open water ditches and lakes. The existing grade is between 7 and 11 ft. The TSP would accelerate the completion of the earthen levee construction along NOV 05 to the authorized design grade of 13 ft. Due to the added height needed to restore the levee to the authorized design grade, additional ROW would be required to allow for the expanded footprint of the levee. Since the ROW is bounded by the presence of LA 23 and a newly constructed Entergy power line on the east side, the additional levee footprint would likely expand to the west into marsh and open water areas along the entire length of the levee bordering the marshlands.

NOV 06

4.14 NOV 06 (Maps 47 to 79; Appendix A) consists of approximately 12.2 miles of earthen back levee on the West Bank, including several short sections of T-wall on the back levee between Happy Jack and Empire. This section of levee is near design grade and would require only a minor elevation restoration, but the stability criteria are below USACE standards. Three sections of floodwall totaling 0.07 mile would require restoration and armoring to increase the stability by removing or incorporating the floodwalls into the earthen levee. The TSP would restore the levee along NOV 06 with earthen fill to the authorized design grade of 13 ft, requiring additional ROW, and restore and armor the three sections of floodwall by incorporating them into the earthen levee within an expanded ROW. The three floodwall sections requiring expanded ROW are a combined distance of 0.07 mile.

NOV 07

4.15 NOV 07 (Maps 79 to 111; Appendix A) consists of approximately 12.6 miles of the West Bank back levee from Port Sulphur to Fort Jackson. The existing grade ranges from 11 to 15 ft. The TSP would restore the earthen levee along NOV 07 to the authorized design grade of 13.5 ft with earthen fill. Numerous sections of the NOV 07 levee would require additional ROW acquisition in order to restore the levee to authorized design grade. LA 23 is directly adjacent to the east side of the levee. These restrictions would affect the amount and location of additional ROW that could be acquired east of the levee and would require probable expansion into the marshlands west of the levee. Expansion of ROW to the west would occur in several areas over a cumulative distance of approximately 4.7 miles.

NOV 08

4.16 NOV 08 (Maps 111 to 134; Appendix A) consists of approximately 8.9 miles of the West Bank back levee from Fort Jackson to Venice. The levee is at or near authorized design grade for most of its length. The TSP would use earthen fill to restore stability berms, if needed, along NOV 08 to stabilize the entire levee reach that is within the existing ROW. LA 23 is very near the east side of the levee and would affect operations on that side of the levee. An expanded ROW into marshland west of the levee would be probable for the entire length of NOV 08.

NOV 09

4.17 NOV 09 (Maps 135 to 142; Appendix A) consists of 2.5 miles of the West Bank MRL from St. Jude Church to City Price Church. The existing grade is between 14.5 and 17.5 ft. The TSP would accelerate the completion of restoring the elevation of the levee along NOV 09 with earthen fill to the authorized design grade of 18.5 ft. This work would require additional ROW.

NOV 10

4.18 NOV 10 (Maps 142 to 171; Appendix A) consists of approximately 13 miles of the West Bank MRL from Happy Jack to Port Sulphur. The existing grade is between 14.5 and 17.5 ft. The TSP would accelerate the completion of restoring the elevation of the levee along NOV 10 to the authorized design grade of 18 ft with earthen fill. Additional ROW would be required.

NOV 11

4.19 NOV 11 (Maps 188 to 202; Appendix A) consists of 11.6 miles of the West Bank MRL from Buras to Fort Jackson. The existing grade is 15.5 ft. The TSP would accelerate the completion of restoring the levee elevation along NOV 11 to the authorized design grade of 17.5 ft with earthen fill. Additional ROW would be required.

NOV 12

4.20 NOV 12 (Maps 202 to 224; Appendix A) consists of 8.8 miles of the West Bank MRL from Fort Jackson to Venice. This section of levee is at the authorized design grade of 14.5 to 16.5 ft. The TSP would restore the levee along NOV 12 with earthen fill to increase the stability and widen and/or raise the stability berm if necessary. Additional ROW would be required.

NOV 13

4.21 NOV 13 (Map 84; Appendix A) consists of restorations to the Empire floodgate and floodwalls on the West Bank back levee, which are tied into the existing levee. The existing elevations of the floodwalls and lock are at 15.6 ft and the design grade is at 19.0 ft. The TSP would construct a new sector gate and new floodwalls along NOV 13 to tie into the restored levee constructed for NOV 07. Work would be done within the existing ROW, except for two sections where additional ROW would be required.

NOV 14

4.22 NOV 14 (Map 177; Appendix A) consists of restoration and armoring of the Empire Lock floodwalls on the West Bank MRL. The existing elevation of the floodwalls and lock are at 14.6 ft and the design grade is at 21.5 ft. The TSP would construct a new sector gate in front of the existing lock and construct new floodwalls to tie into the existing levee.

NOV 15

4.23 NOV 15 (Maps 104, 105, 142, 197 to 199, 223, 224; Appendix A) consists of restoring and armoring of the Childress and Venice floodwalls by replacing with levees to increase stability criteria to meet USACE standards. The floodwalls are at design grade. The TSP would replace the floodwalls with earthen levee, which may include incorporating portions of the existing floodwalls into the new earthen levee. Additional ROW would be required in four sections.

NOV 16

4.24 NOV 16 (Maps 172 to 188; Appendix A) consists of 6.6 miles of the West Bank MRL from Port Sulphur to Buras. The existing grade is 17 ft. The TSP would restore the elevation of the levee along NOV 16 to the authorized design grade of 18 ft with earthen fill. Additional ROW would be required.

ALTERNATIVE 3: AUTHORIZED PRE-KATRINA (GDM) LEVEL OF RISK REDUCTION

4.25 Alternative 3 would be similar to the TSP but would involve restoring the levee by elevating the levee crest with earthen fill and expanding the levee base footprint to provide the necessary design strength to meet the authorized Pre-Katrina (GDM) level of risk reduction, which reduces the risk of hurricane surge and wave-driven flooding in any given year to various levels above or below the 2% elevation. This refers to the authorized pre-Katrina level of risk reduction based on the GDM design that was completed before the 2005 hurricane season. Corridor maps depicting the authorized Pre-Katrina (GDM) level of risk reduction footprint can be found in Appendix A. The difference between Alternative 3 and the TSP are described below.

NOV 01

4.26 NOV 01 (Maps 1 to 38; Appendix A) would be restored to the authorized design grade of 17.5 ft with additional fill material outside the existing ROW.

NOV 02

4.27 NOV 02 (Maps 11, 25; Appendix A) would be the same as Alternative 2 (TSP).

NOV 05

4.28 NOV 05 (Maps 39 to 47; Appendix A) would accelerate the completion of raising the levee to the authorized design grade of 13.0 ft with additional fill outside the existing ROW.

NOV 06

4.29 NOV 06 (Maps 47 to 79; Appendix A) would be restored to the authorized design grade of 13.1 to 15.1 ft with additional fill outside the existing ROW.

NOV 07

4.30 NOV 07 (Maps 79 to 111; Appendix A) would be restored to the authorized design grade of 15.6 ft with additional fill outside the existing ROW.

NOV 08

4.31 NOV 08 (Maps 111 to 134; Appendix A) would be restored using earthen fill outside the existing ROW in order to meet stability criteria.

NOV 09

4.32 NOV 09 (Maps 135 to 142; Appendix A) would accelerate the completion of raising the levee to the authorized design grade of 17.5 ft with additional fill outside the existing ROW.

NOV 10

4.33 NOV 10 (Maps 142 to 171; Appendix A) would accelerate the completion of raising the levee to the authorized design grade of 17.5 ft with additional fill outside the existing ROW.

NOV 11

4.34 NOV 11 (Maps 188 to 202; Appendix A) would accelerate the completion of raising the levee to the authorized design grade of 17.5 ft with additional fill outside the existing ROW.

NOV 12

4.35 NOV 12 (Maps 202 to 224; Appendix A) would be restored using earthen fill outside the existing ROW in order to meet stability criteria.

NOV 13

4.36 NOV 13 (Map 84; Appendix A) would be the same as Alternative 2 (TSP).

NOV 14

4.37 NOV 14 (Map 177; Appendix A) would be the same as Alternative 2 (TSP).

NOV 15

4.38 NOV 15 (Maps 104, 105, 142, 197 to 199, 223, 224; Appendix A) would be the same as Alternative 2 (TSP).

NOV 16

4.39 NOV 16 (Maps 172 to 188; Appendix A) would be restored to the authorized design grade of 17.5 ft with additional fill outside the existing ROW.

Comparative Impacts of Alternatives

4.40 Table 4-1 compares the base and without-project conditions and lists the impacts of the risk reduction plans on the significant resources of the project-affected area. The significant resources are individually described in Section 5 of this SEIS, and the impacts of each alternative plan on each significant resource are detailed in Section 6.

Table 4-1. Comparative Impacts of Alternatives

Alternatives	Impacts on Significant Resources
Geology and Soils	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Negligible or no impacts on geology resulting from the TSP. Soils impacted by the project are relatively abundant in the general area and the loss of these common soils would not have a significant effect on the availability of other similar soils in the area. Prime farmland would not be adversely affected since the soils directly adjacent to the levees are not currently in crop production and are not suitable due to their location.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Wetland Resources	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Permanent, direct, long-term, significant impacts on approximately 147 acres of Waters of the U.S. (WUS), 367 acres of jurisdictional wetlands, and 11 acres of other waters as identified by USACE as a result of the implementation of Alternative 2. Impacts would be mitigated through a compensatory mitigation plan developed by CEMVK.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Permanent, direct, long-term, significant impacts on approximately 506 acres of WUS, 1,161 acres of jurisdictional wetlands, and 43 acres of other waters as identified by the USACE as a result of the implementation of Alternative 3. Impacts would be mitigated through a compensatory mitigation plan developed by CEMVK.
Floodplain Management	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Permanent, direct, significant impacts on approximately 2,069 acres of floodplains would occur if Alternative 2 were implemented.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Permanent, direct, significant impacts on approximately 3,731 acres of floodplains would occur if Alternative 3 were implemented.
Aquatic Resources/Fisheries	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Substantial, direct impacts on fisheries habitat consisting of existing fresh, intermediate, brackish and saline marsh; submerged aquatic vegetation (SAV); mud, sand and shell substrate; water bottoms; and estuarine water column would occur as a result of the implementation of Alternative 2. Some impacts would be temporary; however, many impacts would be permanent.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Essential Fish Habitat (EFH)	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, permanent, direct, moderate impacts on 207.51 acres of EFH intertidal marsh and open water bottoms; however, the CEMVK has committed to creating 134.25 average annual habitat units (AAHUs) of intermediate, brackish, and saline marsh in designated EFH open water areas.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Under Alternative 3, permanent, direct, moderate impacts on approximately 684.29 acres of existing EFH intertidal marsh and open water bottoms.
Water Quality	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, there would be minimal, direct, and indirect short-term impacts on surface water quality. Significant effects on the large-scale water quality resources in the project area would not be expected. Water quality would be temporarily impacted by suspended sediments from levee fill materials due to the expansion of the levee and from stormwater runoff of sediment and miscellaneous construction discharges.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	The impacts on water quality resulting from the implementation of Alternative 3 would be similar to those described in Alternative 2. There would be minimal, direct, and indirect short-term impacts on surface water quality.
Terrestrial Resources	
Alternative 1: No Action Alternative	No significant changes are expected.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, there would be no adverse impacts on upland resources within the project corridor. No significant non-wetland or upland resources occur within the levee footprint at any of the NOV levee sections. It is possible, however, that in the short-term, site preparation and construction disturbances could cause temporary adverse impacts through increased spread and propagation of viable seed sources of non-native and invasive species within and near the project area. Re-vegetating the disturbed areas with native species after project construction is complete would likely limit the spread of non-native and invasive plant species.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Short-term impacts would be similar to those listed in Alternative 2; however, permanent adverse impacts would occur in the project area due to loss of wildlife habitat, nesting, and foraging area.
Wildlife	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, there would be temporary, minor impacts on wildlife within and near the project corridor during the construction period within all NOV levee sections. Wildlife species which would be most directly impacted from the TSP would be small mammals, reptiles, and amphibian species. Any displacement and/or reduction in the number of animals would not severely impact animal communities due to the presence of similar habitats adjacent to the project area and regional commonness of the species displaced. The impacts on foraging habitat and ground-nesting habitat would not be significant due to the presence of similar habitats adjacent to the project area. No long-term, significant impacts on wildlife habitat would be expected. However, the potential for migratory birds to use the project area is high, as the adjacent marshes attract several migratory birds and nesting activity is common. If construction activities begin during migration season, migratory bird surveys would be conducted prior to construction.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Threatened and Endangered (T&E) Species	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, site preparation and construction within the NOV levee sections would have no effect on T&E species within Plaquemines Parish.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Recreational Resources	
Alternative 1: No Action Alternative	No significant changes are expected.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	The TSP would result in temporary increased noise levels near construction activities and could impact recreational resources such as hunting, fishing, and bird watching near the construction zone. Although fish and wildlife habitat disturbance may occur due to construction, the surrounding area provides enough suitable habitats that hunting and fishing activities should not be significantly impacted in the long-term. Access to boat launches, camps, marinas, and businesses may be temporarily impacted due to construction. While the indirect and direct short-term impacts on recreational resources may be moderate, the indirect and direct long-term impacts would be less than significant.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Cultural Resources	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	During field investigations, a total of 43 previously unreported archaeological sites and isolated occurrences (IO) were recorded. Among the 43 archaeological sites, 28 are recommended ineligible, 13 are of undetermined eligibility, and 2 are recommended eligible for the National Register of Historic Places (NRHP) pending SHPO concurrence. Sites within the designated ROW would not be avoided. For the sites of undetermined eligibility, further testing is recommended to determine if the archaeological deposits are historically significant and potentially eligible for the NRHP. For the sites of potential eligibility, USACE has made a preliminary finding of adverse effect, and the Section 106 process will follow a programmatic agreement with the SHPO, the Advisory Council on Historic Preservation (ACHP), tribes, and the local sponsor to phase the identification of eligibility and adverse effects.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2. There are some areas within the Alternative 3 footprint that expanded beyond the 200-foot area surveyed for cultural resources. Impacts on cultural resources within the unsurveyed portions of the expanded Alternative 3 ROW are unknown.
Transportation	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Under Alternative 2, construction easements and transport of construction equipment and materials would temporarily impede vehicle traffic and result in a minimal reduction of the level of service (LOS) along LA 23, LA 39, Highway 11, and on some local road segments. This would result in minimal, temporary impacts, including temporary road closures and congestion, in those areas where construction would occur. Portions of some major and local roadways are within the proposed footprint of the TSP. Relocation of these roadways would result in long-term, adverse impacts on transportation in the area.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Hazardous, Toxic, and Radioactive Wastes (HTRW)	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Because USACE plans to avoid recognized environmental conditions (RECs), the probability of encountering HTRW in the project area is low and no direct or indirect impacts from HTRW would be anticipated. If a REC cannot be avoided, then the non-Federal Sponsor would be responsible for remediation. If construction should reveal the existence of previously unknown HTRW, then work on that section would stop until the risk from HTRW can be evaluated and an appropriate response determined. In many cases, adjacent RECs were identified in the Environmental Site Assessments as areas that were being used for illegal dumping. These "dump" sites were generally found to be of little concern to the project area. The probability of encountering HTRW in the course of the NOV levee project would still be low and direct impacts would not be anticipated.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Noise	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Impacts on the ambient noise environment, resulting from the construction of the NOV levee sections are expected to be short-term and moderate. Approximately 697 single-family homes, one church, one park, and three civic facilities are located within 450 ft of the edge of the project corridor. These sensitive noise receptors may experience noise emissions greater than 65 A-weighted decibels (dBA), which are normally unacceptable. Noise impacts should be less than significant near the residential neighborhoods and civic facilities.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts on the ambient noise environment resulting from the construction of the NOV levee sections are expected to be short-term and moderate. Approximately, 751 single-family homes, two churches, one park, and three civic facilities are located within 450 ft of the edge of the project corridor. These sensitive noise receptors may experience noise emissions greater than 65 dBA, which are normally unacceptable. Noise impacts should be less than significant near the residential neighborhoods and civic facilities.
Air Quality	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	All the NOV levee reaches are located in Plaquemines Parish, which is in attainment for all National Ambient Air Quality Standards (NAAQS); therefore, the air emissions generated by construction of the NOV levee sections would not trigger a conformity determination even if they exceed *de minimis* levels (100 tons per year). As there are no violations of air quality standards and no conflicts with the State Implementation Plans (SIPs), the direct and indirect impacts on air quality from the implementation of Alternative 2 would be short-term and less than significant.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Aesthetic Value (Visual Resources)	
Alternative 1: No Action Alternative	No significant changes are expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	The visual character of the project area would be temporarily impacted by construction and transportation activities related to the project. However, the visual character of the project area should quickly stabilize following construction, and the project area would be returned, as much as possible, to pre-construction conditions. The TSP would not result in a significant change in the physical conditions of the environment or change the overall visual quality of the area. Long-term impacts on the visual resources of the area would occur due to the increased height of the risk reduction measures. However, because of the remote location and lack of public use and access to the project area, indirect or direct visual impacts would be permanent, but less than significant.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Socioeconomic Resources	
Alternative 1: No Action Alternative	No significant changes would be expected.
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	Property values could be adversely impacted in the short-term due to construction noise and traffic congestion. Real estate would need to be purchased under this alternative, but increased economic activity during construction could offset some loss in business. Businesses may have to relocate due to an increase in levee footprint which would cause a short-term loss in revenue and possibly jobs. Any decrease in state revenue from the relocation of businesses, and possible disbandment of businesses, would be insignificant when compared to the revenue generated in the state and the risk reduction provided. Increased flood risk reduction could encourage an increase in population, thereby putting increased demand on public services and facilities. However, the additional risk reduction would support communication systems and public services and facilities. Population in the census block groups within and adjacent to the NOV levee project corridor could increase as a result of the TSP. Community and regional growth would improve with the implementation of Alternative 2 as businesses and individuals would be more likely to return to the area if the levee system were restored. Impacts on community cohesion would be expected to be adverse or neutral.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.
Environmental Justice	
Alternative 1: No Action Alternative	No significant changes would be expected.

Table 4-1, continued

Alternatives	Impacts on Significant Resources
Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction	With the implementation of the TSP, disproportionate impacts on minorities and low-income families would be expected to be adverse or neutral. The majority of the NOV levee project corridor is considered to be an area subject to disproportionate effects on minorities and low-income populations, and there would likely be short-term moderate disproportionate impacts on the population in the project area. Transportation for individuals without vehicles could be temporarily impacted during levee restoration. If minority or low-income individuals' homes are purchased or displaced and they have to relocate, there could be permanent, major disproportionate impacts on low-income or minority populations.
Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction	Impacts would be similar to Alternative 2.

4.41 The NEPA coordination for some potential borrow sources has been previously documented under several IERs. Potential GF borrow areas were coordinated with IERs 18, 22, 25, and 28, while IERs 19, 23, 26, 29, 30, 31, and 32 coordinated certain preapproved CF borrow areas. While contractors may use borrow from an approved CF borrow site as discussed in the IERs, the possibility also exists that a contractor may use an alternative borrow source for which the environmental consequence have not yet be assessed. Prior to any borrow acquisition, the USACE would review the existing environmental documentation to ascertain if additional impact analysis or agency coordination would be necessary. If so, the USACE would produce the appropriate NEPA documentation for that particular borrow area.

4.42 Table 4-2 below describes the impacts on the significant resources as a result of the use of potential GF and CF borrow areas, as described in the IERs. The impacts of borrow use on each significant resource are detailed in Section 6 of this EIS.

Table 4-2. Impacts of Potential GF and CF Borrow Sites

Significant Resources	Impacts
Geology and Soils	Use of GF borrow areas would impact 908.60 acres of prime and unique farmland.
	Use of CF borrow areas would impact 1,353.90 acres of prime and unique farmland.
Wetland Resources	Use of GF borrow areas would have no impacts on jurisdictional wetlands. Use of GF borrow areas would impact 1,658.04 acres of BLH.
	Use of CF borrow areas would impact 0.3 acres of jurisdictional wetlands and 1,504.50 acres of BLH.
Aquatic Resources/Fisheries	No impacts on aquatic resources/fisheries at the proposed GF borrow sites.
	The CF borrow areas at Eastover and 1025 Florissant Hwy contain ponds but they do not support viable fisheries systems. There are no known fisheries resources at the other CF borrow sites.

Table 4-2, continued

Significant Resources	Impacts
Water Quality	With the use of GF and CF borrow areas, there would be direct and indirect water quality impacts; however, with the implementation of best management practices (BMP), the impacts would be temporary, confined, and short-term.
Terrestrial Resources	Direct impacts on non-wetland/upland resources would occur from clearing and excavation of GF and CF borrow sites. Some indirect effects are expected from water accumulating and creating ponds and small lakes. Areas that remain dry would be expected to be colonized by vegetation and woody plant which could offset some habitat loss.
Wildlife	Direct impacts from wildlife displacement may occur during the excavation of GF and CF borrow areas. Bald eagle nests have been noted in the vicinity of several GF and CF borrow areas. Construction contractors would be prohibited from conducting any activity during eagle nesting months within a zone of 660 ft from the nest.
T&E Species	Excavation of the GF and CF borrow areas would not be likely to adversely affect T&E species or their critical habitat.
Cultural Resources	With the use of GF and CF borrow sites, no known significant cultural resources would be impacted because they would be buffered and avoided.
Transportation	With the use of GF and CF borrow areas, transport of construction equipment and materials would temporarily impede vehicle traffic and result in a minimal reduction of LOS on some local road segments. This would result in minimal, temporary impacts, including temporary road closures and congestion, in those areas where excavation would occur.
HTRW	Because USACE plans to avoid RECs, the probability of encountering HTRW in the GF or CF borrow areas is low and no direct or indirect impacts from HTRW would be anticipated.
Noise	Impacts on the ambient noise environment, resulting from the use of the GF or CF borrow sites are expected to be short-term and moderate. Local traffic may have short-term sound levels that are high. Elevated noise levels may impact nearby residents. However, these impacts are expected to be short-term and constrained to construction hours.
Air Quality	Air quality impacts from the use of GF or CF borrow areas would be temporary and would not significantly impair air quality in the region.

GENERAL CONSTRUCTION INFORMATION

4.43 Estimated total construction time for all the NOV levee sections is estimated to be 600 days from mobilization to completion of construction. The first NOV levee contracts are proposed to be awarded in April 2012 and the completion is anticipated by 2015. The following tables display the estimated quantities of borrow needed for the NOV levee project and available borrow resources for GF and CF and their locations (Tables 4-3, 4-4, & 4-5)

Table 4-3. Borrow Material Estimates for NOV Levee Sections

NOV Levee Section	Borrow Material Needed (cubic yards [cy] x 2 x 1000)
NOV 01	3,189
NOV 02	14
NOV 05	694
NOV 06	86
NOV 07	1,578
NOV 08	744
NOV 09	3,292
NOV 10	366
NOV 11	652
NOV 12	8
NOV 13	4
NOV 14	8
NOV 15	538
NOV 16	300
Total	**11,473**

Table 4-4. Potential GF Borrow Sites and Locations

Site	Location (Parish)
West Bank D	Jefferson
West Bank E – Phase 1	Jefferson
West Bank E – Phase 2	Jefferson
West Bank F	Jefferson
West Bank I	Jefferson
Cummings North	Orleans
Stumpf – Phase 1	Orleans
Stumpf – Phase 2	Orleans
Bazile	Plaquemines
Belle Chasse NAS	Plaquemines
Brad Buras	Plaquemines
Tabony	Plaquemines
Tac Carrere	Plaquemines
Triumph East	Plaquemines
910 Bayou Road	St. Bernard
1418/1420 Bayou Road	St. Bernard
1572 Bayou Road	St. Bernard
4001 Florissant	St. Bernard
Dockville	St. Bernard
Johnson/Crovetto	St. Bernard
Bonnet Carre North – Phase 2	St. Charles
Bonne Carre South	St. Charles

*All of the above GF borrow sites have been approved through the NEPA process.

Table 4-5. Non-Exclusive List of Potential CF Borrow Sites and Locations

Site	Location (Parish or County)
Bocage	Ascension
Lilly Bayou	East Baton Rouge
St. Gabriel Redevelopment	Iberville
River Birch Landfill Expansion	Jefferson
River Birch Phase 1	Jefferson
River Birch Phase 2	Jefferson
South Kenner Road	Jefferson
Willswood	Jefferson
Raceland Raw Sugars	Lafourche
Eastover	Orleans
Eastover Phase II	Orleans
Citrus Lands	Plaquemines
Conoco Phillips	Plaquemines
Idlewild Stage 1	Plaquemines
Idlewild Stage 2	Plaquemines
Kimble #2	Plaquemines
Meyer	Plaquemines
Myrtle Grove	Plaquemines
Nairn	Plaquemines
Plaquemines Dirt & Clay	Plaquemines
Scarsdale	Plaquemines
1025 Florissant	St. Bernard
Acosta	St. Bernard
Acosta 2	St. Bernard
Contreras Dirt (Cells E, F, & Z)	St. Bernard
DK Aggregates	St. Bernard
Gatien-Navy Camp Hope	St. Bernard
Spoil Area	St. Bernard
Sylvia Guillot	St. Bernard
3C Riverside	St. Charles
3C Riverside Phase 3	St. Charles
Big Shake	St. James
Willow Bend	St. John the Baptist
Willow Bend Phase II	St. John the Baptist
Levis	St. Tammany
Tammany Holding	St. Tammany
Frierson	Hancock County, MS
Henley	Hancock County, MS
King Mine	Hancock County, MS
Pearlington Dirt Phase 1	Hancock County, MS
Pearlington Dirt Phase 2	Hancock County, MS
Port Bienville	Hancock County, MS

*All of the above CF borrow sites have been approved through the NEPA process.

4.44 Construction Staging Areas and Access Roads. Staging areas for the temporary storage of construction materials and access roads would be needed at various locations throughout the project area. The two main criteria for selecting staging and access route locations were: (1) the locations must not contain wetlands, as determined by USACE/USFWS land-use analysis and the USACE Regulatory Branch jurisdictional determination, and (2) the selected sites must be

located within the cultural resources survey area and avoid impacts on cultural resources documented during the cultural resources survey. The results of the surveys were included in this SEIS and in a report, "Draft Management Summary, Phase I Cultural Resources Survey of New Orleans to Venice Federal Levees, Plaquemines Parish, 2010." Temporary staging areas would be located in nonforested cleared nonwetland areas in close proximity to the levees and construction. The locations of these areas are depicted in Figures 3-2 through 3-5. Access roads are discussed in the Transportation Section of Section 6 in this SEIS. If, during construction, it is determined that staging areas and access or haul roads would be situated outside the areas of analysis, then supplemental NEPA documentation would be necessary.

4.45 Heavy equipment that would likely be used during demolition and construction activities would include haulers, excavators, pile drivers (vibratory and hammer), dozers, graders, cranes, backhoes and water trucks. Existing public roads would be used to transport equipment, personnel, and supplies.

SECTION 5.
AFFECTED ENVIRONMENT

5. AFFECTED ENVIRONMENT

5.1 This section of the SEIS describes the natural and human environment that exists in and surrounding Plaquemines Parish and the potential effects on those resources as a result of the Proposed Action and alternatives. Only those parameters that have the potential to be affected by the Proposed Action and alternatives are described, as per CEQ guidance (40 CFR 1501.7 [3]).

Environmental Setting

5.2 The project area is located in Plaquemines Parish within the Mississippi River Deltaic Plain of the lower Mississippi River ecosystem. Higher elevations occur on the natural levees of the river and its distributaries. Developed lands are primarily associated with natural levees, but extensive wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development. Extensive wetlands and associated shallow open waters dominate the landscape outside of the storm risk reduction levees.

5.3 The area is characterized by the low elevations from 5 ft NAVD to sea level. Due to its proximity to the Gulf of Mexico, the area has a subtropical marine climate. The major natural vegetative communities are levee forest and marshes. The marshes and estuarine waters provide the basis for a good sport and commercial fishery for finfish and shellfish. Harvestable animal species include furbearers and waterfowl, as well as alligator (*Alligator mississippiensis*) and white-tailed deer (*Odocoileus virginianus*). Fishing, hunting, boating, and camping are popular recreational activities in the area.

5.4 The main topographical feature of the project area is the Mississippi River which runs through the area in a general northwest to southeast direction. The major land features of the area consist of natural levees with dry land adjacent to the river and various bayous flanked by extensive low marshlands. No tributaries enter the river below New Orleans. A system of distributaries discharges the Mississippi River flow to the Gulf of Mexico. Of these, only South and Southwest Passes are maintained as navigable waterways and are used by seagoing commerce. The area is laced by bayous and waterways which carry rainwater and marsh floods from the land to the Gulf of Mexico (USACE 1974).

5.5 The largest portion of the surrounding area consists of low marshlands containing numerous shallow bays and lakes. The general elevation of the marshes is approximately 0.5 to 1.5 ft above mean sea level. The shoreline facing the Gulf of Mexico is irregularly shaped and is indented with numerous bays and tidal inlets with only a few well-developed sand beaches.

5.6 The area may be classified as an inter-deltaic estuary basin which has direct exposure to the sea and only limited freshwater inflow. It is essentially saline with isohalines of constant salt concentration generally paralleling the shoreline and ranging from approximately 20 parts per thousand (ppt) adjacent to the Gulf of Mexico to 0 ppt nearer the Mississippi River.

5.7 The climate of the project area is influenced by its subtropical latitude and proximity to the Gulf of Mexico. Southerly winds, especially during the summer, produce favorable conditions for thunderstorms. In the colder seasons, the area is subjected to frontal movements that produce squalls and sudden temperature drops. During winter and spring, river fogs are common due to the differential in temperature between the water and the air. Normally, the flood season occurs from December to early June and the hurricane season from June to October. The average annual temperature is 70° Fahrenheit (F), with monthly means ranging from 57° F in January to 83° F in July/August.

RELEVANT RESOURCES

5.8 Table 5-1 describes the relevant resources that are assessed in this SEIS. Their importance, institutionally, technically, and publicly are also described.

Table 5-1. Relevant Resources

Resource	Institutionally Important	Technically Important	Publicly Important
Geology and Soils	Farmland Protection Policy Act of 1981; Soils Conservation Act.	The potential for a project component to result in on- or off-site lateral spreading, subsidence, liquefaction, or collapse.	People or structures can be exposed to loss, injury or death if a geologic unit is not properly considered during design.
Wetland Resources	Clean Water Act of 1977, as amended; EO 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968, EO 11988, and Fish and Wildlife Coordination Act of 1958.	Provide necessary habitat for various species of plants, fish, and wildlife; they serve as ground water recharge areas; provide storage areas for storm and flood waters; serve as natural water filtration areas; provide protection from wave action, erosion, and storm damage; and provide various consumptive and non-consumptive recreational opportunities.	There is a high value that the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes.
Floodplains	EO 11988 (Floodplain Management), as amended by EO 12608	Federal and state agencies are required to avoid direct or indirect support of development within the 100-year floodplain whenever there is a practicable alternative.	The public is concerned about the development in floodplains and subsequent flooding.
Aquatic Resources/ Fisheries	Fish and Wildlife Coordination Act of 1958, as amended. State policies may apply as well.	Critical element of many valuable freshwater and marine habitats; an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources.	The public places high priority on their aesthetic, recreational, and commercial value.

Table 5-1, continued

Resource	Institutionally Important	Technically Important	Publicly Important
Essential Fish Habitat	Magnuson-Stevens Fishery Conservation and Management Act of 1996, P.L 104-297	Federal and state agencies recognize the value of EFH. The Act states EFH is "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity".	Public places a high value on seafood and the recreational and commercial opportunities EFH provides.
Estuarine Water Bodies	Clean Water Act of 1977, Fish and Wildlife Coordination Act, Coastal Zone Management Act of 1972, Louisiana State & Local Coastal Resources Act of 1978	USACE, USFWS, NMFS, NRCS, USEPA, LDWF, and LDNR recognize value of fisheries and good water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources.
Water Quality	Clean Water Act of 1977, Fish and Wildlife Coordination Act, Coastal Zone Management Act of 1972, and Louisiana State & Local Coastal Resources Act of 1978.	USACE, USFWS, NMFS, NRCS, USEPA, LDWF, and LDNR recognize value of fisheries and good water quality. National and state standards established to assess water quality.	Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water.
Terrestrial Resources	Food Security Act of 1985, as amended; the Farmland Protection Policy Act of 1981; the Fish and Wildlife Coordination act of 1958, as amended.	Provides habitat provided for both open- and forest-dwelling wildlife, and the potential provision of forest products and human and livestock food products.	The public places high priority on the present economic value or potential for future economic value.
Bottomland Hardwood Forest	Section 906 of the WRDA of 1986 and the Fish and Wildlife Coordination Act of 1958, as amended.	Provides necessary habitat for a variety of plant, fish, and wildlife species; it often provides a variety of wetland functions and values; it is an important source of lumber and other commercial forest products; and it provides various consumptive and non-consumptive recreational opportunities.	The public places high priority on its aesthetic, recreational, and commercial value.
Wildlife	Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act (MBTA) of 1918	Critical element of many valuable aquatic and terrestrial habitats; are an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources.	The public places high priority on their aesthetic, recreational, and commercial value.

Table 5-1, continued

Resource	Institutionally Important	Technically Important	Publicly Important
Threatened and Endangered Species	The Endangered Species Act of 1973, as amended; the Marine Mammal Protection Act of 1972; and the Bald Eagle Protection Act of 1940.	USACE, USFWS, NMFS, NRCS, USEPA, LDWF, and LDNR cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem.	The public supports the preservation of rare or declining species and their habitats.
Recreational Resources	Federal Water Project Recreation Act of 1965 as amended and Land and Water Conservation Fund Act of 1965 as amended	Provide high economic value to local, state, and national economies.	Public makes high demands on recreational areas. There is a high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana; and the large per-capita number of recreational boat registrations in Louisiana.
Cultural Resources	National Historic Preservation Act of 1966, as amended; the Native American Graves Protection and Repatriation Act of 1990; and the Archaeological Resources Protection Act of 1979	State and Federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, and to design and construction values; and for their ability to yield important information about prehistory and history.	Preservation groups and private individuals support protection and enhancement of historical resources.
Transportation	Federal Highway Administration	Provide high value to local, state, and national economies.	The public places high priority on transportation systems and traffic loads.
Hazardous, Toxic, and Radioactive Waste	Resource Conservation and Recovery Act of 1976, as amended by Hazardous and Solid Waste Amendments of 1984; Comprehensive, Environmental Response, Compensation, Liability Act of 1980, as amended by Emergency Planning and Community Right-to-Know Act of 1986.	State and Federal agencies recognize the value of a clean environment. National and state standards established to assess contamination.	Virtually all citizens express a desire for a clean environment.
Noise	Noise Control Act of 1972, as amended by Quiet Communities of 1978.	National and state standards established to assess noise levels. Compliance with surface carrier noise emissions.	Citizens are concerned about exposure to noise levels due to health reasons and annoyance.

Table 5-1, continued

Resource	Institutionally Important	Technically Important	Publicly Important
Air Quality	Clean Air Act of 1963 and Louisiana Environmental Quality Act of 1983.	State and Federal agencies recognize the status of ambient air quality in relation to the National Ambient Air Quality Standards.	Virtually all citizens express a desire for clean air.
Aesthetics	USACE ER 1105-2-100, and National Environmental Policy Act of 1969, the Coastal Barrier Resources Act of 1990, Louisiana's National and Scenic Rivers Act of 1988, and the National and Local Scenic Byway Program.	Visual accessibility to unique combinations of geological, botanical, and cultural features that may be an asset to a study area. State and Federal agencies recognize the value of beaches and shore dunes.	Environmental organizations and the public support the preservation of natural pleasing vistas.
Socio-Economic Resources	River and Harbor Flood Control Act of 1970 (P.L. 91-611), Section 122, Water Resources Development Act of 2007.	Federal projects must provide an economic benefit to the U.S. public. Community cohesion and long-term economic growth is important for maintaining community viability.	Social concerns and items affecting area economy are of significant interest to community.
Environmental Justice	EO 12898 and the Department of Defense's Strategy on Environmental Justice of 1995.	The social and economic welfare of minority and low-income populations may be positively or disproportionately impacted by the TSP.	Public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental and human health consequences of Federal laws, regulations, policies, and actions.

Significant Resources

5.9 The discussions to follow provide the existing conditions of those significant resources associated with the 90 miles of levee in Plaquemines Parish.

GEOLOGY AND SOILS

5.10 This resource is institutionally significant because construction of storm risk reduction measures relies on an understanding of the stability of a geologic unit. Geology is technically significant because of the potential of a project component to result in on- or off-site lateral spreading, subsidence, liquefaction, or collapse. Geology is publicly significant because people or structures can be exposed to loss, injury or death if a geologic unit is not properly considered during design.

5.11 Soils represent the youngest geologic unit in contact with the flood risk reduction measures. As such, they can have a significant impact on the performance of flood risk

reduction measures, particularly levees, due to compaction, liquefaction or stability with depth. Soils are also the earth layer most directly impacted by disturbance during construction; factors such as erodibility, loss of productivity, and regional distribution can influence flood risk reduction design and construction methods.

Geology

5.12 The subsurface geology of Plaquemines Parish consists of Holocene near-surface sediments deposited by the modern Mississippi River Balize Delta within the past 1,000 to 1,300 years over Pleistocene and Holocene marine muds and silts in the Gulf of Mexico. The Holocene delta deposits vary from very fine-grained silts and muds to fine-grained sands which were deposited as the Mississippi River gradually prograded a delta to its current position at the edge of the continental shelf (Frazier 1967). Constrained by the flood-control levees along the river, the modern Mississippi River delta is extended in a linear configuration into the Gulf of Mexico. The Holocene delta deposits range from over 260 ft thick near Venice to approximately 80 ft thick near New Orleans (USACE 1974).

5.13 The delta sediments upon which Plaquemines Parish sits are in the process of dewatering and compacting with the passage of time, resulting in a general subsidence of the land surface relative to sea level. The rates of subsidence vary among researchers who have studied the area, but generally are considered to be between 2.1 and 3.5 ft per century in the area of Plaquemines Parish and the modern Mississippi River delta. The existing levees have accelerated the subsidence process beneath their footprint due to compaction, and within the levees due to reduction of river sedimentation. No active subsurface faults are known to be present under the project area; however, the Bastian Bay fault system, located just west of the Mississippi River, and the Empire fault system located farther west, have been documented to have recent surface displacement, and could extend beneath the river and the flood risk reduction levees. Both of these fault systems have been active since the 1970s and contribute to the continuing subsidence of the marsh areas west of the river (Dawers and Martin 2005).

5.14 Within a varying distance east and west from the Mississippi River, the river's natural levee deposits consist of coarser sands and silts, which have a lower compaction ratio, and result in higher landform elevations. The bulk of occupied Plaquemines Parish within the levee system is located on the natural levee system of the Mississippi River; however, continued subsidence has resulted in the majority of the parish area within the levees being now below sea level.

5.15 Within the project footprint area, there are no published data which would identify the exact distribution of sand, silt and clay within the Holocene deposits. It is reasonable to assume that the typical distribution of channel deposits, natural levees, interdistributary bay sediments and delta front bar deposits would all be present within the Holocene sediment column in the project area. Typical spatial distribution of geologic facies of this type can be found in publications by Roberts (1997), Frazier (1967), and Fisk (1954). Numerous oil and gas exploration wells have been drilled around the project levee footprints, and logs from these wells may give more understanding of the exact composition of sediments under the levee footprints.

Soils

5.16 Within the areas protected by the hurricane and flood risk reduction levees in Plaquemines Parish, soil components present include the following:

- Cancienne silt loam – a very deep, somewhat poorly drained mineral soil with moderate to slow permeability. This soil is generally found in cropland, and is classified as prime farmland soil.

- Cancienne silty clay loam – very similar to Cancienne silt loam, but with a higher clay content. It is also classified as prime farmland soil.

- Schriever clay – a very deep, poorly drained clayey alluvium soil with very slow permeability. This soil is generally found in cropland, and is classified as prime farmland soil.

- Harahan clay – a very deep, poorly drained clayey alluvium soil with very slow permeability. This soil is formed on backswamp that has been drained, and is kept relatively dry by pumping and levee protection. It is relatively fluid when wet, reflecting its origin as backswamp alluvium.

- Westwego clay – a mix of clayey and organic matter artificially drained and kept dry by levee protection. It is poorly drained with very slow permeability, having formed from artificially drained brackish marsh.

5.17 Outside the levee system, the soils present are generally classified as muck, underlying marsh lands that are either permanently or frequently flooded. The existing levees are either not classified as a soil type, or are classified as aquents (disturbed soil areas where the original soil material has been removed, repositioned or fill has been added) or dredged material. None of the soils in the area are considered highly erodible.

Prime Farmland

5.18 Prime farmland is protected under the Farmland Protection Policy Act (FPPA) of 1980 and 1995. The FPPA's purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. As required by Section 1541(b) of Act, 7 U.S. Code (USC) 4202(b), Federal agencies are required (a) to use the criteria to identify and take into account the adverse effects of their programs on the preservation of farmland; (b) to consider alternative actions, as appropriate, that could lessen adverse effects; and (c) to ensure that their programs, to the extent practicable, are compatible with state and local governments and private programs and policies to protect farmland.

5.19 Prime farmlands are those farmlands that have the best combination of physical and chemical properties to be able to produce fiber, feed, or food, and are available for these uses. Unique farmland is defined as land other than prime farmland that is used for producing specific high-value food and fiber crops.

5.20 According to the Natural Resources Conservation Service (NRCS), Cancienne silt loam and silty clay loam, and Schriever clay, are classified as prime farmland. Most of these soils within the areas protected by the levees were in crop production or pasture prior to Hurricane Katrina in 2005. Generally, however, prime farmland soils used for crop production are not located directly adjacent to the existing levees, but are separated from the levee structures by ditches or roads. By virtue of their provenance and location on the natural levees adjacent to the Mississippi River, the more valuable prime farmlands are located near the river levees, and the quality and elevation of the soils decreases away from the river toward the back levees adjacent to marshes and open water areas.

WETLAND RESOURCES

5.21 This resource is institutionally significant because of the Clean Water Act (CWA) of 1977, as amended; EO 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; the Estuary Protection Act of 1968, and the Fish and Wildlife Coordination Act of 1958. Wetlands are ecologically significant because they serve as ground water recharge areas and provide storage for storm and flood waters, they serve as natural water filtration areas, and they provide protection from wave action, erosion, and storm damage. Additionally, wetlands provide various consumptive and non-consumptive recreational and commercial opportunities, and provide habitat for numerous fish and wildlife species.

5.22 EO 11990 directs Federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practical alternative exists. Section 404 of the CWA of 1977 (P.L. 95-217) authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into WUS, including wetlands. WUS (Section 328.3[2] of the CWA) are those waters used in interstate or foreign commerce, subject to ebb and flow of tide, and all interstate waters including interstate wetlands. WUS are further defined and may include all other waters such as intrastate lakes, rivers, streams, mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, natural ponds, or impoundments of waters, tributaries of waters, and territorial seas. Jurisdictional boundaries for these water resources are defined in the field as the ordinary high water mark which is that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural lines impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

5.23 Wetlands are defined as "areas that are inundated or saturated at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (40 CFR 230.3). The *1987 Corps of Engineers Wetland Delineation Manual* and the *2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* follows a three-parameter approach to wetland delineations. A site must contain hydric soils, wetland hydrology, and a dominance of hydrophytic vegetation in order to be considered a wetland (Environmental Laboratory 1987 and USACE 2008a).

5.24 Wetland delineations were performed in accordance with Section D, Subsection 2 of *Technical Report Y-87-1, Corps of Engineers Wetlands Delineation Manual* and the *2008 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region.* References include the 2006 U.S. Department of Agriculture (USDA) NRCS Soil Survey Geographic database of Plaquemines Parish (USDA/NRCS 2006), and the *National List of Plant Species That Occur in Wetlands: Southeast* (Region 2), May 1988 (USFWS 1988). Field investigations were conducted in May, September, and October 2008 to determine the presence and extent of potential jurisdictional wetlands on the project corridor. Aerial photography was also used to delineate wetland, WUS, and other waters' boundaries for some locations that were inaccessible.

5.25 The vegetation mosaic in a given locale is primarily a function of climate, soil type, and suitable water conditions, including depth of water table, length and frequency of inundation, flow, and water quality. Since the source of salinity in coastal Louisiana is the Gulf of Mexico, salinity levels exist along a gradient, which declines as the saltwater moves inland. A distinct zonation of vegetative habitat types occupied by specific plant communities differing in salinity tolerance exists along a gradient. The dominant vegetative habitats which occur along a decreasing salinity gradient from the coast toward inland areas include salt, brackish, intermediate, and freshwater organic marshes, swamp, and BLH communities. Transition between adjacent zones is typically found to be an integration of communities rather than appearing as an abrupt change from one community to another. Coastwide, the range of salinity within each of these vegetation zones can vary significantly; however, the typical ranges of salinity that occur most frequently are much narrower. Intermediate marshes are influenced by an irregular tidal regime and salinity varies from 3 to 10 ppt. Optimal conditions in intermediate marshes are assumed to occur when mean salinity during the growing season is 2.5 ppt or less. Brackish marshes typically have a mean salinity of 8 ppt and saline marshes exhibit a mean salinity of 16 ppt or greater. Average annual salinities greater than 10 ppt are assumed to be progressively more harmful to brackish marsh vegetation (USACE 2008a).

5.26 The wetlands generally observed throughout the project corridor consisted of freshwater marshes, backwater riverine wetlands (batture), intermediate, brackish, and saline marsh communities, and BLH forests. Wetland community types observed on-site were relatively similar in vegetative structure and composition.

5.27 The freshwater marsh communities are generally located adjacent to intermediate marsh along the northernmost extent of the intermediate marshes, although it may occur beside coastal bays where freshwater input is entering the bay. Small pools or ponds may be scattered throughout these communities. The batture community is a strip of land between the Mississippi River and the MRL and consists of freshwater marsh and BLH communities. The soils and soil moisture are influenced by elevation gradients and the spring flood pulses of the Mississippi River. Both of these communities exhibit high natural resource and wildlife habitat values, and are an important migratory flyway (National Oceanic Atmospheric Administration [NOAA] 2007). The intermediate marsh community was found south of the freshwater marshes along the western back levee. These marshes are found in the transitional zone from the fresh to saline marsh communities.

5.28 The freshwater marsh and batture communities are often dominated by Chinese tallow (*Triadica sebifera*), black willow (*Salix nigra*), and hackberry (*Celtis laevigata*). Shrub species consists of baccharis (*Baccharis halimifolia*), giant reed (*Phragmites australis*), widely scattered silky dogwood (*Cornus amomum*), and purple rattle bush (*Sesbania punicea*). Herbaceous species consisted of Chinese tallow, torpedo grass (*Panicum repens*), taro (*Colocasia antiquorum*), elephant's ear (*Colocasia esculenta*), giant reed, Vasey grass (*Paspalum urvillei*), foxtail (*Setaria geniculata*), swamp dock (*Rumex verticillatus*), jaborosa (*Jaborosa integrifolia*), California bulrush (*Schoenoplectus californicus*), and southern beakrush (*Rhynchospora microcarpa*).

5.29 Intermediate, brackish, and saline marsh communities consist of Chinese tallow and black willow species in the tree stratum, while baccharis, marsh-elder (*Iva frutescens*), purple rattle bush, black willow, and giant reed dominate the shrub stratum. Herbaceous species include saltmeadow cordgrass (*Spartina patens*), smooth cordgrass (*Spartina alterniflora*), black needlerush (*Juncus roemerianus*), California bulrush, southern beakrush, foxtail, baccharis, and Chinese tallow.

5.30 BLH forests in the project area include Chinese tallow, silky dogwood, hackberry, bitter pecan (*Carya aquatica*), persimmon (*Diospyros virginiana*), bald cypress (*Taxodium distichum*), live oak (*Quercus virginiana*), water oak (*Quercus nigra*), baccharis, and black willow in the tree and shrub stratums, and alligator weed (*Alternanthera philoxeroides*), smart weed (*Polygonum hydropiper*), and southern beakrush in the herbaceous stratum. A variety of birds utilize these hardwoods for nesting, breeding, brooding, and perching. Hard mast (nuts) and soft mast (samaras, berries, *etc.*) provide a valuable food source for birds, mammals, and other wildlife species.

5.31 Open water habitat within the project area consists of ponds, lakes, canals, bays, and bayous. Natural marsh ponds and lakes are typically shallow, ranging in depth from 6 inches to over 2 ft. Typically, the smaller ponds are shallow and the larger lakes and bays are deeper. In fresh and low salinity areas, ponds and lakes may support varying amounts of SAV and floating-leaved vegetation. Brackish and, much less frequently, saline marsh ponds and lakes may support wigeongrass (*Ruppia maritima* L.) (USFWS 2007d). The location of wetlands that could be impacted can be found on the corridor maps in Appendix A.

FLOODPLAIN MANAGEMENT

5.32 EO 11988 (Floodplain Management), as amended, requires Federal agencies to avoid direct or indirect support of development within the 100-year floodplain whenever there is a practicable alternative. A floodplain is defined as the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, and including, at a minimum, that area subject to a 1% or greater chance of flooding in any given year. The critical action floodplain is defined as the 500-year floodplain (USEPA 2008). The 500-year floodplain as defined by 40 CFR 9 as an area, including the base floodplain, which is subject to inundation from a flood having a 0.2% chance of being equaled or exceeded in any given year.

5.33 Flood zones are land areas identified by the Federal Emergency Management Agency (FEMA) that describe the land area in terms of its risk of flooding. A flood insurance rate map (FIRM) is a map created by the National Flood Insurance Program for floodplain management and insurance purposes. Digital versions of these maps are called DFIRMs. A FIRM would generally show a community's flood zones and floodplain boundaries. However, maps are constantly being updated due to changes in geography, construction and mitigation activities, and meteorological events (FEMA 2008a).

5.34 EO 11988 requires that Federal agencies proposing activities in a 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. In accordance with 44 CFR Part 9, critical actions, such as the development of hazardous waste facilities, hospitals, or utility plants, must be undertaken outside of a 500-year floodplain. If no practicable alternatives exist to siting an action in a floodplain, the action must be designed to minimize potential harm to or within the floodplain. Furthermore, a notice must be publicly circulated explaining the action and the reason for siting in a floodplain. When evaluating actions in the floodplain, FEMA applies the decision process described in 44 CFR Part 9, referred to as the Eight-Step Planning Process, to ensure that its actions are consistent with EO 11988. The Eight-Step Planning Process is as follows:

- *Step 1.* Determine whether the Proposed Action is located in a wetland and/or the 100-year floodplain (500-year floodplain for critical actions) and whether it has the potential to affect or be affected by a floodplain or wetland;

- *Step 2.* Notify the public at the earliest possible time of the intent to carry out an action in a floodplain or wetland, and involve the affected and interested public in the decision-making process;

- *Step 3.* Identify and evaluate practicable alternatives to locating the Proposed Action in a floodplain or wetland (including alternative sites, actions and the "No Action" option). If a practicable alternative exists outside the floodplain or wetland FEMA must locate the action at the alternative site;

- *Step 4.* Identify the potential direct and indirect impacts associated with the occupancy or modification of floodplains and wetlands and the potential direct and indirect support of floodplain and wetland development that could result from the Proposed Action;

- *Step 5.* Minimize the potential adverse impacts and support to or within floodplains and wetlands to be identified under Step 4, restore and preserve the natural and beneficial values served by floodplains, and preserve and enhance the natural and beneficial values served by wetlands;

- *Step 6.* Reevaluate the Proposed Action to determine first, if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain and wetland values and second, if alternatives preliminarily rejected at Step 3 are practicable in light of the information

gained in Steps 4 and 5. FEMA shall not act in a floodplain or wetland unless it is the only practicable location;

- *Step 7.* Prepare and provide the public with a finding and public explanation of any final decision that the floodplain or wetland is the only practicable alternative; and

- *Step 8.* Review the implementation and post-implementation phases of the Proposed Action to ensure that the requirements stated are fully implemented. Oversight responsibility shall be integrated into existing processes.

5.35 The NEPA compliance process involves the same basic decision-making process as the Eight-Step Planning Process. The public review process for this SEIS would cover several steps in the planning process.

5.36 The low-lying areas of Plaquemines Parish are subject to periodic flooding from intense rainfall, abnormally high tides in the Gulf of Mexico, hurricanes or lesser tropical disturbances, and/or combinations of these events. In the northern portion of Plaquemines Parish, the predominant flooding source is rainfall and surface runoff (USACE 2006b). Pumping facilities within protected areas are not capable of discharging large volumes of surface runoff from severe storms. This problem is exacerbated with subsidence of the landscape typical of wetland areas that were drained/pumped for conversion to agricultural and/or urban land use.

5.37 Areas in the southern portion of Plaquemines Parish also experience flooding associated with rainfall, surface runoff, and ponding as described above; however, the greatest threat to the area is hurricane surge inundation due to its location and elevation relative to the Mississippi River delta (USACE 2006b). As hurricanes approach coastal Louisiana from any direction, large volumes of water are pushed inland over the low marshlands and into small watercourses, ditches, and canals. Risk reduction levees, in combination with the MRL, provide protection for the pumped areas from hurricanes having recurrence intervals of 10 years or less. During severe hurricanes, overtopping of the levees can occur and cause severe flooding.

5.38 Because most of the project area is below sea level, a network of levees was built to protect inland areas from storm surge and tidal inflows. While protecting the landward areas from tidal flow, these levees leave the area vulnerable to flooding from accumulated rainfall. To alleviate flooding from rainfall, pump stations have been constructed along the storm surge levees. A network of canals and subsurface drainage features collect and deliver stormwater runoff to the pump stations (USACE 2006b). The pump stations discharge the stormwater over the risk reduction levees into the adjacent wetlands.

5.39 Plaquemines Parish Government controls 16 pumping stations located in drainage districts on the east and west banks of the Mississippi River (USACE 2006b). Five pump stations are located on the east bank and 11 pump stations are located on the west bank of the Mississippi River. In addition, there are two pump stations on the West Bank that are privately owned and operated by Citrus Lands Corporation.

5.40 Three parish-operated pump stations pump water out of the area protected by levees along the Gulf Intracoastal Waterway (GIWW), Algiers Alternate Route, and the West Bank and Vicinity, New Orleans, Louisiana, Hurricane Protection Project (USACE 2006b). The remaining four parish-owned and two privately-owned pump stations pump water out of areas protected by non-Federal levees.

5.41 The pump stations and the levees were damaged by Hurricane Katrina when it made landfall near Buras-Triumph, which is located within the NOV Levee System (USACE 2006b). The resulting storm surge exceeded the level of the constructed protection. Numerous breaches occurred along the back levees on both the east and west bank sides of the NOV levee corridor. Levees were overtopped and breached along both the back levees and the MRL which caused significant flood damage to the pump stations. The pump stations also experienced damage from the high winds and wind-driven water.

5.42 According to the FEMA-supported Louisiana Mapping Project (LaMP), an estimated 95% of Plaquemines Parish is located in a floodplain with most of the parish at elevations below or very near sea level. Consistent with EO 11988, preliminary DFIRMs published by FEMA on November 13, 2008, were examined during the preparation of this SEIS (LaMP 2009) and are described in the following sections. The DFIRMs which illustrate the flood hazard zones for Plaquemines Parish can be found at http://www.lamappingproject.com/parish-plaquemines.html (FEMA 2008b). Table 5-2 shows the DFIRMs used for each levee section and the boundary of the 100-year floodplain for which each section falls.

Table 5-2. Floodplains Located Within the Project Corridor

NOV Levee Section	DFIRM numbers	Boundary
NOV 01	221390165B, 221390410B, 221390170B, 221390430B, 221390435B, 221390445C, and 221390465C	Portions of NOV 01 within the floodplain; bordered by floodplains to the north along most of the levee, and to the south of the southern terminus and to the north of the northern terminus.
NOV 02	221390435B and 221390410B	Portions of NOV 02 within the floodplain; bordered by floodplains to the north.
NOV 05	221390445C and 221390465C	Entire NOV 05 within the floodplain.
NOV 06	221390465C, 221390655C, 221390660C, 221390680C, 221390675B, and 221390690D	Entire NOV 06 within the floodplain.
NOV 07	221390690D, 221390880C, 221390885C, and 221390905C	Entire NOV 07 within the floodplain.
NOV 08	221390905C, 221390910C, 221390920C, and 221390940C	Entire NOV 08 within the floodplain.
NOV 09	221390445C, and 221390465C	Entire NOV 09 within the floodplain.
NOV 10	221390465C, 221390655C, 221390660C, 221390680C, and 221390690D	Entire NOV 10 within the floodplain.
NOV 11	221390885C and 221390905C	Entire NOV 11 within the floodplain.
NOV 12	221390885C and 221390905C	Entire NOV 12 within the floodplain.
NOV 13	221390880C and 221390609D	Entire NOV 13 within the floodplain.
NOV 14	221390609D	Entire NOV 14 within the floodplain.

Table 5-2, continued

NOV Levee Section	DFIRM numbers	Boundary
NOV 15 – Duvic Pump Station	221390910C and 221390920C	Entire NOV 15 Duvic Pump Station within the floodplain.
NOV 15 – Grand DeLiard Pump Station	221390905C	Entire NOV 15 Duvic Pump Station within the floodplain.
NOV 15 – Point Michel Floodwall	221390465C	Entire NOV 15 Point Michel Floodwall within the floodplain.
NOV 15 – Childress Floodwall	221390905C	Entire NOV 15 Childress Floodwall within the floodplain.
NOV 15 – Venice Floodwall	221390940C	Entire NOV 15 Venice Floodwall within the floodplain.
NOV 16	221390690D, 221390880C, and 221390885C	Entire NOV 16 within the floodplain.

AQUATIC RESOURCES/FISHERIES

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

5.44 The NOV levee project area is located in the coastal plain of Louisiana where freshwater from upland river systems mix with tidally influenced salt water. Aquatic organisms which inhabit this highly diverse ecosystem are generally tolerant of a wide range of salinities and water column depth. The NOV proposed levee projects fall within the Louisiana Eco-regions of the Coastal Deltaic Plain and Mississippi River (LDEQ 2010b). The project area for the NOV levees encompasses EFH, including estuarine wetland substrates (mud, sand, shell, rock, and associated biological communities), marine water column, a limited presence of sub-tidal vegetation (SAV, sea grasses, and algae), inter-tidal vegetation (marshes), shallow open water with non-vegetated bottoms, and continental shelf features. The natural waterbodies found within the NOV levee project area include the Mississippi River, Breton Sound, and Barataria Bay.

5.45 Larval and post-larval life stages of aquatic species such as blue crab (*Callinectes sapidus*), several drum species, and shrimp utilize flooding tides to migrate through the many channels associated with Breton Sound and Barataria Bay (BTNEP 1996a). Currents and salinity gradients are vital to migrating aquatic species where eggs, larvae, and juvenile fisheries species could experience greater impacts due to resident time and energy required for migration mechanisms as compared to adult species (NOAA Fisheries 2009). Many estuarine living marine resources (Estuarine Living Marine Resources 1992) species spend a portion of their life stage in the bays of the Barataria Basin and Breton Sound.

5.46 The Breton Sound basin encompasses approximately 676,400 acres including an estimated 184,100 acres of wetlands (LaCoast 1993). Breton Sound has experienced long-term

impacts from subsidence, saltwater intrusion, wetland erosion, levee construction, storms (Chabreck and Palmisano 1973) and oil and gas exploration (LaCoast 1993). U. S. Geological Survey (USGS) estimates that 40 square miles of land were lost within Breton Sound as a result of Hurricane Katrina (USGS 2006). The major hydrological features associated with Breton Sound are the Mississippi River and its natural levee ridges, the Caernarvon Canal, and the freshwater diversion at Caernarvon. The Caernarvon Freshwater Diversion Canal (CFDC), built in 1991, is approximately 1 mile long and transports freshwater from the Mississippi River diversion at Caernarvon to Big Mar Lake (pond). The Caernarvon Canal is approximately 100 to 150 ft wide and drains the urban area east of the CFDC. The channels within the project are tidally influenced with a low salinity range, not to exceed 2 practical salinity units (LDNR 2003). The wetlands adjacent to CFDC have successfully enhanced marsh productivity by increasing vegetative growth, reducing erosion (Beck et al. 2003), and increasing commercial and recreational fisheries (USACE 2008a).

5.47 Many of the NOV levee project areas, on the protected side of the levee, tend to be fresh water. These freshwater habitats are highly valued by sport fishermen who pursue freshwater species such as largemouth bass (*Micropterus salmoides*), alligator gar (*Atractooteus spatula*), channel catfish (*Ictalurus punctatus*), blue catfish (*I. furcatus*), white crappie (*Pomoxis annularus*), black crappie (*P. nigromaculatus*), various species of sunfish (*Lepomis* spp.), crawfish (*Procambarus clarkii*), flathead catfish (*Pylodictis olivaris*), and spotted gar (*Lepisosteus oculatus*).

5.48 The upper reaches of Breton Sound and Barataria Bay have more brackish waters and provide habitat to a wide variety of economically important invertebrates such as brown shrimp (*Farfantepenaeus aztecus)*, pink shrimp (*F. duorarum)*, white shrimp (*Litopenaeus setiferus*), blue crabs, and oysters (*Crassostrea virginica*). Estuarine fish such as red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis),* sheepshead *(Archosargus probatocephalus),* speckled trout (*Cynoscion nebulosus)*, and Atlantic croaker (*Micropogonias undulates*) also inhabit the brackish water habitat. Additionally, Louisiana's estuarine habitat produces many species of fish that are not harvested for recreation or as commercial seafood. These important fish contribute to the fisheries food web by serving as prey species for predators along the coast and offshore. These prey species include rainwater killifish (*Lucania parva)*, naked goby (*Gobiosoma bosc*), Gulf pipefish (*Syngnathus scovelli*), clown goby (*Microgobius gulosus*), pinfish (*Lagodon rhomboides*), bay anchovy (*Anchoa mithcilli*), speckled worm eel (*Myrophis punctatus*), mullet (*Mugil cephalus*), menhaden (*Brevoortia patronus*), and Gulf killifish (*Fundulus grandis*). Due to the extensive decline of Louisiana's coastal marsh, protection of fragile aquatic habitat is a concern in all NOV levee construction activities.

5.49 Historically, levee construction along the lower Mississippi River has degraded the floodway, isolated floodplain lakes, raised river banks, and reduced the land mass of the floodplain (Fremling et al. 1989). Levee construction and control structures increased river stage and velocities of discharge by preventing natural overbank flows into the adjacent floodplain (Baker et al. 1991). Despite these anthropogenic impacts, free-flowing riverine conditions currently exist that support diverse and productive aquatic communities (Felley 1992).

5.50 Intertidal and subtidal portions of the NOV levee system have been identified as EFH for various life stages of Federally managed species, including postlarval and juvenile stages of red drum, brown shrimp, white shrimp, and Gulf stone crab (*Menippe adina*). The primary categories of EFH that would be affected by project implementation are estuarine water bottoms and estuarine water column in the upper reaches. Detailed information on Federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council (GMFMC). The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1996 (Magnuson-Stevens Act; P.L. 104-297). Further discussion of EFH can be found in the EFH section of this SEIS.

5.51 Wetlands and water bottoms in the project area provide nursery and foraging habitats for a variety of economically important marine fishery species such as blue crab, gulf menhaden, spotted seatrout, sand seatrout (*Cynoscion arenarius*), southern flounder (*Paralichthys lethostigma*), and striped mullet. Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (*e.g.*, mackerels, snappers, and groupers) and highly migratory species managed by NMFS (*e.g.*, billfishes and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, which contribute to the overall productivity of the Barataria Bay estuary.

Commercial Fisheries

5.52 The area bounded by Breton Sound and Barataria Bay creates prolific nursery grounds for white and brown shrimp, blue crab, oysters and menhaden. These important fisheries contribute to a significant portion of the annual commercial fishing landings in Louisiana. Commercial fish landing data from 2003 through 2008 for Louisiana were collected from NOAA Fisheries (2009) and used for the following analyses. The shrimp, crab, oyster, and menhaden fisheries produce $273,483,103 per year (median value 2003 through 2008) which constitutes approximately 89% of the total value of landings in Louisiana (NOAA Fisheries 2009). Prior to the BP Deepwater Horizon oil spill, data collected revealed that commercial fishing vessels directly employed 26,474 fishermen and provided economic benefits in several supporting sectors such as boat building and repairs, net construction, and value-added seafood items. Cumulatively, commercial fisheries generated $2.4 billion in economic benefits per year in the Louisiana economy (Southwick 2008). As previously mentioned, the landings of all the fisheries species in the State of Louisiana included finfish, shrimp, crabs, and benthic fauna. Table 5-3 presents the five species of fish and invertebrates that provided the greatest economic impact to Louisiana fisheries prior to the BP Deepwater Horizon oil spill. Barataria Bay and Breton Sound provide nursery grounds for these economically important species listed in the table below.

Table 5-3. Percent Value Annual Commercial Fisheries Landings (median) by Species

Percent Value of Louisiana Annual Commercial Fishery Landings (2003-2008)	
Species	**Percent of Value**
White shrimp	35
Brown shrimp	16
Blue crab	12
Menhaden	13
Oysters	13
Finfish	11
Total	**100**

Source: NOAA Fisheries 2009

5.53 Statewide, a total of 39.1 million pounds of brown shrimp and 62.1 million pounds of white shrimp were landed in 2005, with an estimated economic value to fisheries of $41.3 million and $91.9 million, respectively (USACE 2004). NMFS annual shrimp landing data from 1988 through 2000, indicated a continued trend of brown shrimp landings greater than those of white shrimp in the collective areas of Barataria Bay and Breton Sound. In 1985, NMFS reported exceptionally high landings of brown shrimp, and peak landings of brown shrimp and white shrimp were similar to those observed in the 1970s. The high landings could be the result of the freshwater flushing of local wetlands during the 1983 flooding of the area (USACE 1998).

5.54 Statewide, a total of 38.1 million pounds of blue crab were landed in 2005, an estimated value of $27.4 million (USACE 2004). The blue crab is an important commercial species for the Lake Borgne basin. Additionally, a total of 12.1 million pounds of oyster were harvested in 2005, with an estimated value of $33.3 million (USACE 2004). Louisiana oyster production has remained relatively stable for over 50 years; however, present day stressors on the Louisiana oyster industry are threatening the long-term sustainability of both the industry and the resource. Coastal land loss and saltwater intrusion are reducing the amount of protective marsh. Additionally, increased salinity in coastal environments can promote rapid stress from disease and predation (*i.e.* oyster drill) on oyster reefs (Sonait *et al.* 2004).

Recreational Fisheries

5.55 In Louisiana, coastal and offshore recreational fishing stimulate $757 million in economic output and creates 7,733 jobs (Southwick 2008). National fisheries statistics (NOAA Fisheries 2009) include catch by year, species, and fishing mode for all available species caught by recreational activities from 2003 through 2008. The largest harvests of marine recreational fish species by weight in Louisiana were red drum, speckled trout, black drum, sheepshead, sand seatrout, king mackerel (*Scomberomorous cavalla*), and red snapper (*Lutjanus campechanus*) (NOAA Fisheries 2009). Red drum, red snapper, and king mackerel are Federally managed species. The total weight of annual fishing landings for a variety of species is presented in Table 5-4.

Table 5-4. Annual Recreational Fishery Landings (median value from 2003 through 2008 recreational fisheries)

Louisiana Annual Landings (2003-2008) for Popular Recreational Catch		
Species	**Total Recreational Catch (Number)**	**Total Recreational Catch (lbs)**
Menhaden	NA	NA
Brown shrimp	NA	NA
White shrimp	NA	NA
Blue crab	NA	737,953
Red drum	5,417,500	10,352,363
Spotted seatrout	14,135,500	10,013,847
Black drum	1,254,500	2,146,419
Red snapper	229,500	480,269
Other shrimp	NA	NA
King mackerel	264,000	57,280

Source: NOAA Fisheries 2009
NA - Not applicable

ESSENTIAL FISH HABITAT

5.56 The project area is located within the Plaquemines Mississippi Deltaic Plain (MDP), estimated to have formed within 750 to 500 years before present (B.P.) (Saucier 1994). Historically, a framework of ridges and barrier islands protected interior fresh marsh from the high energy marine environment and saltwater intrusion (Costanza et al. 1983). Anthropogenic impacts, erosion, subsidence, storms and other natural coastal processes have fragmented and degraded the extensive marshes that once protected coastal Louisiana (Craig et al. 1979).

5.57 EFH has statutory significance because of the Magnuson-Stevens Act which requires the eight regional fishery management councils to describe and identify EFH in their respective regions, with intent to protect, conserve, and enhance this valuable resource. EFH is technically and Federally defined as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." Categories of EFH that are designated within the NOV levee project area include estuarine wetlands (inter-tidal vegetation), estuarine water column, substrates (mud, sand, shell, rock, and associated biological communities), a limited presence of sub-tidal vegetation (SAV, sea grasses, and algae), and shallow open water with non-vegetated bottoms. The Magnuson-Stevens Act requires the NOAA Fisheries to assist the regional fishery management councils in the implementation of EFH in their respective Fishery Management Plans (FMP). The EFH descriptions and identifications for Gulf of Mexico FMPs were approved on February 8, 1999 for 26 selected species and coral complexes. Today the GMFMC manages 28 species of marine fish and invertebrates associated EFH within their respective FMPs. Detailed information on Federally managed fisheries and their EFH is provided in the 2005

generic amendment of the Gulf of Mexico FMPs prepared by the GMFMC, as required by the Magnuson-Stevens Act (GMFMC 2005). Additional descriptions of the aquatic habitats found within the project area are discussed in the wetland section.

5.58 Coastal vegetation that comprises EFH is considered to be institutionally significant because this resource is a topic of concern in a number of Federal regulations including the Coastal Barrier Resources Act of 1982; Coastal Zone Management Act of 1972; Emergency Wetlands Resources Act of 1986; Estuary Protection Act of 1968; Fish and Wildlife Conservation Act of 1980; the Fish and Wildlife Coordination Act of 1958, as amended; Migratory Bird Conservation Act; MBTA; ESA of 1973; Magnuson Fishery Conservation and Management Act of 1990; National Environmental Policy Act of 1969; the North American Wetlands Conservation Act; the WRDA of 1976, 1986, 1990, and 1992; and Executive Order 13186 Migratory Bird Habitat Protection. Coastal vegetation resources are technically significant because they are highly productive (Mitsch and Gosselink 1993), provide essential fisheries and wildlife habitat, and serve as a bio-indicator for coastal water quality and additional habitat suitability for many aquatic and semi-aquatic invertebrates (Phipps 1979).

5.59 Water bottoms and benthic resources are significant EFH resources because of the benthic organisms which are involved in physical and chemical processes that contribute greatly to the trophic structure of consumer groups such as bacteria and fungi, microalgae, meiofauna, and microfauna (Day et al. 1989; Mitsch and Gosselink 1993). Other members of the epibenthic community (USACE 2007, Kirk 2008) include oysters and mussels (*Mytilus edulis*) that create reef habitats (Lauenstein and Cantillo 1993) utilized by marine and other aquatic organisms. Specifically, functional benthic organisms include macrobenthic (*e.g.,* mollusks, polychaetes, decapods); microbenthic (protozoa); meiobenthic (*e.g.,* nematodes, harpacticoids copepods, tubillaria); epibenthic; infauna (*e.g.,* most bivalves); interstitial fauna (*e.g.,* beach meiofauna, tardigrades); suspension-feeders (*e.g.,* bryozoans and bivalves); filter-feeders (*e.g.,* poriferans, tunicates, bivalves); nonselective deposit feeders (*e.g.,* gastropods); selective deposit feeders (*e.g.,* nematodes, sand dollars, fiddler crabs); raptorial feeders and predators (*e.g.,* star fish and gastropod drills); and parasites and commensuals (*e.g.,* parasitic flatworms, copepods, and pea crabs). Biological and geological associations of benthic organisms are also important in sustaining fisheries habitat.

5.60 Today, the MDP is considered to be a "working coast" (Day *et al.* 2007) where flood-protection infrastructure must be integrated into natural resources, oil and gas production, agriculture (Turner and Streever 2002), urban development, and commercial and recreational fishing (Day et al. 2007). A need to conserve and protect EFH along the NOV levee system has become clear to scientists, engineers, political leaders, and the general public where efforts are focused not only on sustaining fisheries, but also the enhancement of the economic and environmental entities associated with fisheries productivity and management along the project corridor.

5.61 In addition to being designated as EFH for various Federally managed species, wetlands and water bottoms in the project area provide nursery foraging habitats for a variety of economically important marine fishery species such as blue crab, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, and striped mullet. Additionally, species such as the

striped mullet, Atlantic croaker, sand seatrout, pinfish, spot (*Leiostomus xanthurus*), anchovies (*Anchoa* sp.), and killifish, as well as various shellfish species and benthic organisms occur in the project area and serve as prey for fish species managed under the Magnuson-Stevens Act by the GMFMC (*e.g.,* mackerels, snappers, and groupers) and highly migratory species managed by NMFS (*e.g.,* billfishes, and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, and contribute to overall productivity of the Barataria Bay and Breton Sound estuaries.

5.62 The EFH located on the flood side of the NOV levee project corridor includes Barataria Bay, Breton Sound, and several canals and bayous adjacent to the levee system. Additionally, several tributaries are located within the protected side of the NOV levee project area and designated as EFH by GMFMC. The proposed NOV levee project corridor is located in an area identified as EFH for larval, postlarval, juvenile, sub-adult, and adult life stages of brown shrimp, white shrimp, red drum, and Gulf stone crab. Table 5-5 presents the species-specific EFH requirements during the various life stages of the Federally managed fish.

Table 5-5. Designated EFH for Federally managed Species that Occur in the NOV Federal Levee Project Area

Species	Life Stage	Designated EFH
Brown shrimp	Eggs/larvae	Nearshore and offshore gulf waters (< 360 ft, demersal)
	Post larval/juvenile	Marsh edge, SAV, tidal creeks, inner marsh
	Sub-adult	Mud bottoms, marsh edge
	Adult	Neritic gulf waters, silt muddy sand, and sandy substrates
White shrimp	Eggs/larvae	Nearshore gulf waters < 131 ft from shoreline
	Post larval/juvenile	Marsh edge and ponds, SAV, inner marsh, oyster reefs
	Sub-adult	Same as post larval/juvenile
	Adult	Nearshore gulf waters to 98 ft from shoreline
Red drum	Eggs/larvae	Nearshore and offshore gulf waters
	Post larval/juvenile	SAV, estuarine mud bottoms, marsh/water interface
	Sub-adult	Estuarine and marine mud and sand bottoms, oyster reefs, estuarine water column
	Adult	Estuarine water column (Gulf shoreline to 164 ft in depth), shell substrate; estuarine and marine mud bottoms
Gulf stone crab	Eggs	59 ft sand, shell, and soft bottom
	Larvae, Post larval, Juvenile	59 ft, oyster reefs, sand, shell, and soft bottoms

5.63 Three marsh types are represented along the project corridor according to USGS Biological Resources Division, National Gap Analysis Program (GAP), Louisiana GAP Analysis Project conducted post-Hurricane Katrina (Louisiana Atlas 2007). The marsh types are intermediate, brackish, and saline which are further discussed in the wetland section. These marshes serve as nursery habitat for many aquatic species throughout their life stages (*e.g.,* egg, larval, and juvenile).

WATER QUALITY

5.64 This resource is institutionally significant because of the CWA of 1977, as amended. The Mississippi River and adjacent waters are significant because they provide habitat for various

species of wildlife, finfish, and shellfish. Waters surrounding Plaquemines Parish also constitute oyster seed and lease areas, and EFH. The Mississippi River and adjacent waters are publicly significant because of the public's desire for recreational use for fishing, boating, and bird watching. The Mississippi River provides a source of water supply for the public and is also used for waterborne transportation.

5.65 The Mississippi River is North America's longest and largest river and the fifth largest river worldwide. The Mississippi River flows 2,333 miles from Lake Itasca in northern Minnesota to its delta in southern Louisiana. The Mississippi River drainage basin is the world's second largest, draining 1.83 million square miles, including tributaries from 32 U.S. states and two Canadian provinces. The Mississippi River watershed encompasses 40% of the contiguous U.S. Major tributaries include the Missouri, Ohio, Arkansas-White-Red, and Tennessee Rivers. Breton Sound is located to the east of the project area and Barataria Bay is located to the west.

5.66 Section 303(d) of the CWA requires that states develop a list of waters which are not meeting water quality standards and not supporting their designated uses. In response to this mandate, LDEQ has prescribed water quality standards for surface waters within the State of Louisiana in order to promote healthy and productive aquatic systems. Surface water standards are set to protect the quality of all waters of the state, including rivers, streams, bayous, lakes, reservoirs, wetlands, estuaries, and many other types of surface water. Standards apply to pH, temperature, bacterial density, dissolved oxygen (DO), chloride concentration, sulfate concentration, and total dissolved solids (TDS). Designated Uses are activities or conditions that water resources can sustain such as primary contact recreation which includes swimming and water skiing, secondary contact recreation which includes boating and sailing. Fish and Wildlife Propagation is a Designated Use which includes ecological conditions that are conducive to the propagation of aquatic organisms and are measured by water quality parameters that affect the health of fish and wildlife such as the concentration of DO, TDS, nutrients, *etc*. Additionally, there is a designated use for oyster propagation which includes a standard for bacterial densities and one for drinking water that sets criteria for levels of bacteria, and a number of different metals and toxins. The project corridor is located adjacent to 48 miles of the southern Mississippi River and is located in four LDEQ sub-watersheds. There is another sub-watershed located immediately south of the project corridor near Venice, called the Mississippi River Passes (070401). The four sub-watersheds are in attainment for all criteria; only the 070401 sub-watershed that is located south of the project corridor is in non-attainment. With the exception of the elevated levels of fecal coliform bacteria in the 070401 sub-watershed, the regional water bodies consistently maintain good water quality (LDEQ 2006). Figure 5-1 presents the location of the NOV project corridor and LDEQ watershed boundaries.

TERRESTRIAL RESOURCES

5.67 These resources are institutionally significant because of the Food Security Act of 1985, as amended; the Farmland Protection Policy Act of 1981; and the Fish and Wildlife Coordination Act of 1958, as amended. These resources are technically significant because of the habitat provided for both open- and forest-dwelling wildlife, and the provision or potential for provision of forest products and human and livestock food products. These resources are publicly significant because of their present economic value or potential for future economic value.

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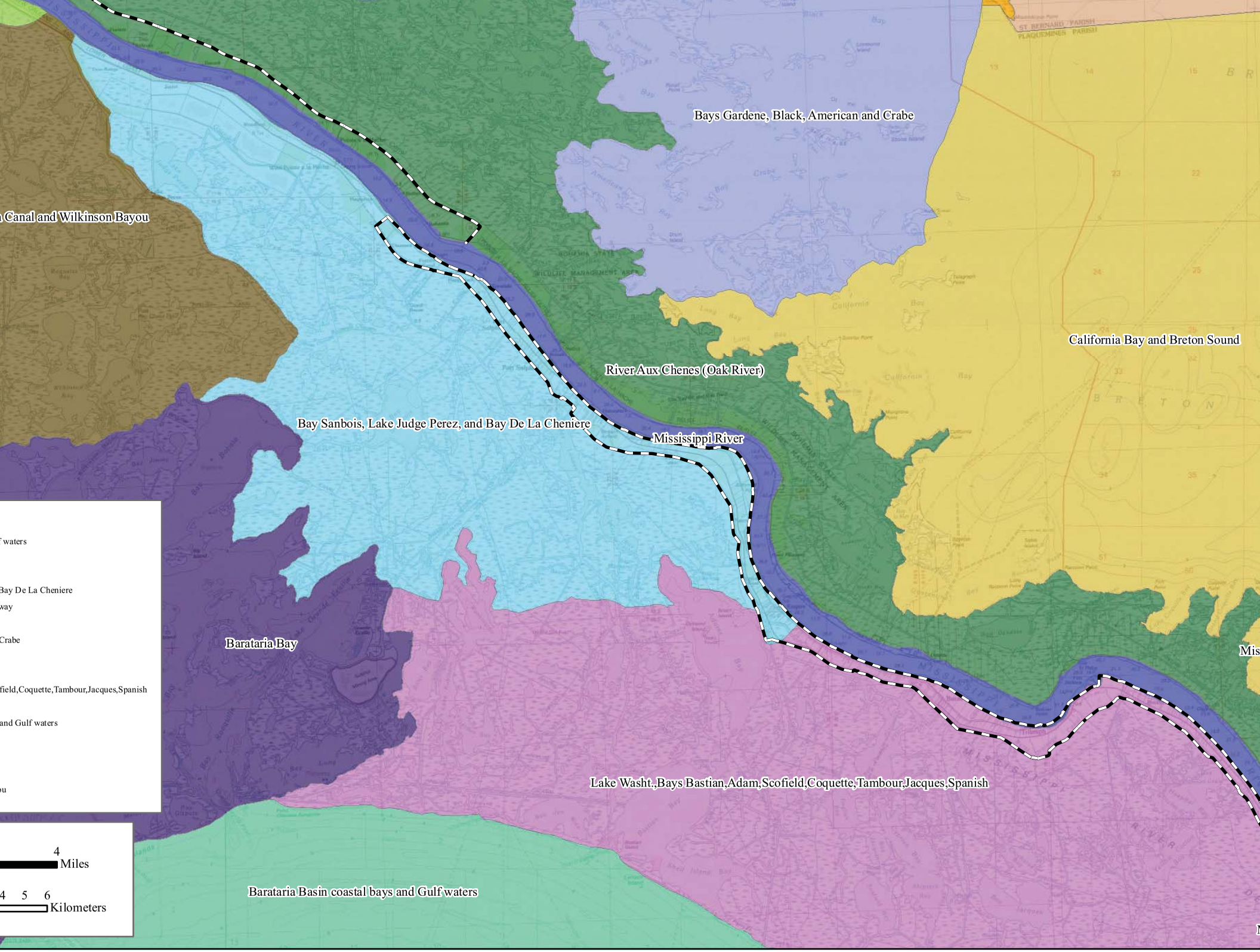
Bays Gardene, Black, American and Crabe
Canal and Wilkinson Bayou
California Bay and Breton Sound
River Aux Chenes (Oak River)
Bay Sanbois, Lake Judge Perez, and Bay De La Cheniere
Mississippi River
Barataria Bay
Lake Washt.,Bays Bastian,Adam,Scofield,Coquette,Tambour,Jacques,Spanish
Barataria Basin coastal bays and Gulf waters
waters
Bay De La Cheniere
way
Crabe
field,Coquette,Tambour,Jacques,Spanish
and Gulf waters
4
Miles
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5.68 Several species of trees are found (Table 5-6) along the natural levee flank, but for the most part large forested stands are not found. Most of the protected acreage between the MRL and the back levees has been developed for urban or agricultural uses. Major natural vegetative communities are scrub-shrub habitat and marshes. Isolated areas of BLH forests and drained marshes (wetland pasture) still remain. Much of the levee forest which was cleared for agriculture and later abandoned is now a shrub/scrub or old field habitat characterized by highly tolerant species typical of disturbed areas.

Table 5-6. Native Levee Trees and Shrubs

Scientific Name	Common Name
Sabal minor	dwarf palmetto
Quercus virginiana	live oak
Acer rubrum var. *drummondi*	Drummond red maple
Salix nigra	black willow
Myrica cerifera	wax myrtle
Celtis laevigata	hackberry
Liqidambar styraciflua	sweetgum
Taxodium distichum	bald cypress
Baccharis halimifolia	baccharis
Ilex decidua	possum haw

5.69 The wetlands observed throughout the project corridor consist of freshwater marshes, backwater riverine wetlands (batture), intermediate, brackish, and saline marsh communities, and BLH forests (See Wetland Resources).

5.70 BLH are defined as forested alluvial wetlands typically occupying floodplain regions of large flooding waterbodies and rivers (Cowardin et al. 1979). They occur in areas where the natural hydrologic regime alternates between wet and dry periods. Common tree species found within these habitats include American elm (*Ulmus americana),* green ash (*Fraxinus pennsylvanica),* water hickory (*Carya aquatica),* nuttall oak (*Quercus nutall),* Chinese tallow tree, and red maple *(Acer rubrum).* Understory species may include dwarf palmetto, wax myrtle, possum haw, and swamp dogwood (*Cornus foemina).* Other common species that may be present include poison ivy (*Toxicodendron radicans),* trumpet creeper (*Campsis radicans),* pepper-vine *(Ampelopsis arborea)*, and greenbrier (*Smilax* spp.). BLH provide important foraging areas and habitat for a variety of wildlife, but BLH within the project area are fragmented, disturbed, and secondary. Most of the BLH in the project area are disturbed and contain large concentrations of invasive Chinese tallow trees.

5.71 Cypress-tupelo swamps are located in transitional zones between BLH and lower-elevation marsh or scrub-shrub habitats, and flood on a regular basis. Cypress-tupelo swamps exist where salinities are very low (near 0 ppt), there is minimal daily tidal action, and it is usually flooded throughout most of the growing season. Bald cypress and water-tupelo (*Nyssa aquatica*) are the dominant vegetation within this habitat type, but Drummond red maple, green ash, and black willow also occur. Water lily (*Nyphaea odorata),* pickerelweed (*Pontederia cordata*), smart weed, and non-native alligator weed are also common.

5.72 Scrub-shrub habitat within the project vicinity also support woody vegetation generally less than 20 ft in height and occur in partially drained fresh marsh or other wetland. The scrub-shrub habitat includes native vegetation such as baccharis and wax myrtle and several non-native and invasive species adapted to drier conditions have colonized within a scrub-shrub habitat, particularly Chinese tallow trees. Forested and shrub/scrub habitats within the project area provide habitat for resident passerine birds and essential resting areas for many migratory bird species.

5.73 Terrestrial resources in the area also include developed areas such as residential and commercial areas, as well as roads and existing levees. Most of the development is located on the higher elevations of the Mississippi River natural levees. Some wetland pasture exists in the project area at lower elevations in marshes altered by spoil banks, drainage projects or agriculture and is usually bordered by development or along the existing hurricane protection system. Some wetland pasture still provides grazing for cows and other livestock. The project area also contains active and abandoned agricultural fields. Current agriculture uses include cattle-farming, hay production citrus groves, and other commercial crops.

WILDLIFE

5.74 This resource is institutionally significant because of the Fish and Wildlife Coordination Act of 1958, as amended, and the MBTA of 1918. Wildlife resources are technically significant 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 they support many species that are important commercial and recreational resources. Wildlife resources are publicly significant because of the high priority that the public places on their aesthetic, recreational, and commercial value. Based on 2006 data, wildlife viewing, photography, and feeding had a total net economic effect in Louisiana of $517 million (Southwick 2008).

5.75 The project area contains a great variety of mammals, birds, reptiles, and amphibians. Species inhabiting the area include nutria (*Myocaster coypus*), muskrat (*Ondatra zibethicus*), mink (*Mustela vison*), river otter (*Lutra canadensis*), raccoon (*Procyon lotor*), white-tailed deer, Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), swamp rabbit (*Sylvilagus aquaticus*), eastern cottontail (*Sylvilagus floridanus*), gray squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), nine-banded armadillo (*Dasypus novemcinctus*), coyote (*Canis latrans*), and a variety of smaller mammals. The project area also provides habitat for the American alligator, various species of salamanders, toads, frogs, and turtles, as well as several species of venomous and non-venomous snakes.

5.76 Various raptors such as great horned (*Bubo virginianus*) and barred (*Strix varia*) owls, red-shouldered hawk (*Buteo lineatus*), northern harrier (*Circus cyaneus*), American kestrels (*Falco sparverius*), and red-tailed hawk (*Buteo jamaicensis*) may be present. Passerine birds in the areas include sparrows, vireos, warblers, northern mockingbirds (*Mimis polygottos*), grackles, red-winged blackbirds (*Agelaius phoeniceus*), wrens, blue jays (*Cyanocitta cristata*), northern cardinals (*Cardinalis cardinalis*), and crows (*Corvus* spp.). During spring and fall migrations, neo-tropical migrants are found passing through the project area.

5.77 Marshes and SAV of the general project area provide important habitat and foraging areas for non-game wading birds, shore birds, and sea birds. Common wading birds and shore birds are listed in Table 5-7. American white (*Pelecanus erythrorhynchos*) and brown (*P. occidentalis*) pelicans are also found in the project vicinity. Additionally, numerous non-resident wading and shorebirds would be found in the project area during the winter and annual migrations.

Table 5-7. Common Wading and Shorebirds of the NOV Levee Project Area

Scientific Name	Common Name
Ardea herodias	great blue heron
Egretta caerulea	little blue heron
Egretta tricolor	tricolored heron
Casmerodius albus	great egret
Egretta thula	snowy egret
Nycticorax nycticorax	black-crowned night heron
Butorides striatus	green-backed heron
Eudocimus albus	white ibis
Himantopus mexicanus	black-necked stilt
Charadrius vociferous	killdeer
Catoptrophorus semipalmatus	willet

5.78 Marshes and SAV of the general project area also provide important habitat and foraging areas for resident and migratory waterfowl found principally during winter. Swamps, fresh, and intermediate marshes usually receive greater waterfowl utilization than brackish and saline marshes, because they generally provide more waterfowl food (USFWS 2007c). Many of these waterfowl species provide hunting opportunities during the prescribed hunting seasons and recreational birding opportunities throughout the year. Table 5-8 lists common waterfowl that could be expected in the project area, either year-round or during the winter migration period.

Table 5-8. Common Waterfowl of the NOV Levee Project Area

Scientific Name	Common Name
Anas discors	blue-winged teal
Gallinula chloropus	common moorhen
Anhinga anhinga	American anhinga
Anas fulvigula	mottled duck
Aix sponsa	wood duck
Podiceps spp.	grebes
Phalacrocorax auritus	double-crested cormorant
Chen caerulescens	snow goose
Anas strepera	gadwall
Anas platyphynchos	mallard
Anus acuta	common pintail
Anus americana	American wigeon
Gavia immer	common loon

Table 5-8, continued

Scientific Name	Common Name
Anas crecca	green-winged teal
Aythya valisineria	canvasback
Aythya collaris	ring-necked duck
Aythya affinis	lesser scaup
Bucephala clangula	common goldeneye
Bucephala albeola	bufflehead
Oxyura jamaicensis	ruddy duck
Mergus serrator	red-breasted merganser
Lophodytes cucullatus	hooded merganser
Fulica americana	American coot
Anas clypeata	northern shoveler
Porphyrula martinica	purple gallinule
Rallus longirostris	clapper rail

5.79 Significant portions of the coastal U.S. breeding populations of olivaceous cormorants (*Phalacrocorax brasilianus*), anhingas (*Anhinga anhinga*), little blue herons, tricolored herons, black-crowned night herons, white ibis, glossy ibis (*Plegadis falcinellus*), sandwich terns (*Sterna sandwicensis*), Forster's terns (*Sterna fosteri*), and black skimmers (*Rhynchops niger*) nest in Louisiana (LDWF 2003).

5.80 In the Barataria-Terrebonne Basin system, 353 species of birds have been recorded, including breeding, transient, and wintering species. The number of breeding species of birds in the Barataria-Terrebonne Basin declines steadily from north to south. This is an effect caused by habitat changes; the amount of forested habitat also declines from north to south. The coastal marshes and barrier islands have relatively few breeding species, because they have relatively low habitat diversity. Transients tend to concentrate at the coast, regardless of habitat, because it is either their first or last landfall (Barataria-Terrebonne National Estuary Program [BTNEP] 1996b).

THREATENED AND ENDANGERED SPECIES

5.81 This resource is institutionally significant because of the ESA, the Marine Mammal Protection Act of 1972, and the Bald Eagle Protection Act of 1940. Endangered or threatened species are technically significant because the status of such species provides an indication of the overall health of an ecosystem. These species are publicly significant because of the desire of the public to protect them and their habitats.

5.82 The ESA [16 USC 1531 *et. seq*] of 1973, as amended, was enacted to provide a program for the preservation of Threatened and Endangered (T&E) species and to provide protection for the ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protection programs for designated species and to use their authorities to further the purposes of the act. Responsibility for the identification and protection of T&E species and any potential recovery plan lies with the Secretary of the Interior and the Secretary of Commerce.

5.83 The USFWS is the primary agency responsible for implementing the ESA, and is responsible for birds and other terrestrial and freshwater species. The USFWS responsibilities under the ESA include: (1) the identification of T&E species; (2) the identification of critical habitats for listed species; (3) implementation of research on, and recovery efforts for, these species; and (4) consultation with other Federal agencies concerning measures to avoid harm to listed species. The NMFS has the responsibility for sea turtles, while in the ocean, some anadromous fishes, and marine mammals. Critical habitat, as defined in the Act is a specific geographic area that contains features essential for the conservation of a threatened or endangered species that may require special management and protection and is needed for a species recovery. USFWS requires consultation with Federal agencies regarding critical habitat so ensure that actions would not destroy or adversely modify critical habitat.

5.84 The USFWS has identified species that are candidates for listing as a result of identified threats to their continued existence. The candidate designation includes those species for which the USFWS has sufficient information to support proposals to list as endangered or threatened under the ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.

5.85 The Louisiana Natural Heritage Program (LNHP) maintains lists of T&E species and plant communities in Louisiana. These species are not necessarily the same as those Federally protected by the USFWS under the ESA. Several Federally and state-listed species are known to occur in the vicinity of the project area (Table 5-9). However, the project footprint has been heavily impacted by human activities and provides no or low quality habitat for T&E species.

Table 5-9. Federal and State T&E Species Potentially Occurring in the Plaquemines Parish Project Area

Scientific Name	Common Name	Federal Status	State Status	Potential to Occur in Project Corridor?
Trichechus manatus	West Indian manatee	Endangered	Endangered	No
Pelecanus occidentalis	brown pelican	none	Endangered	Yes
Charadrius melodus	piping plover	Threatened, Critical Habitat	Threatened	No
Falco peregrinus	peregrine falcon	none	Threatened/ Endangered	Yes
Haliaeetus leucocephalus	bald eagle	delisted	Endangered	Yes
Acipenser oxyrhinchus desotoi	gulf sturgeon	Threatened	Threatened	No
Scaphirhynchus albus	pallid sturgeon	Endangered	Endangered	Yes
Chelonia mydas	green sea turtle	Threatened	Threatened	Yes
Eretmochelys imbricata	hawksbill sea turtle	Endangered	Endangered	Yes
Lepidochelys kempii	Kemp's ridley sea turtle	Endangered	Endangered	Yes
Dermochelys coriacea	leatherback sea turtle	Endangered	Endangered	Yes
Caretta caretta	loggerhead sea turtle	Threatened	Threatened	Yes

Source: USFWS 2010c, LDEQ 2010a, and LDWF 2008a

West Indian Manatee

5.86 Federally and state-listed as an endangered species, West Indian manatees can be found in shallow, slow-moving rivers, estuaries, salt-water bays, canals, and coastal areas (BTNEP 2007). West Indian manatees are typically found in waters with dense submerged aquatic beds or floating vegetation where the species grazes on a variety of aquatic plants. West Indian manatees occasionally enter Lake Pontchartrain, Lake Maurepas, and associated coastal waters and streams during the summer months (*i.e.*, June through September) (USACE 2006a). Manatees have been reported in the Amite, Blind, Tchefuncte, and Tickfaw Rivers (on the northern shore of Lake Pontchartrian), and in canals within the adjacent coastal marshes of Louisiana. They have also been occasionally observed elsewhere along the Louisiana Gulf coast. The manatee has declined in numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution. Although manatees are transient visitors to south Louisiana, it is unlikely that one would occur in the project area because the project area is outside of their normal range and no aquatic plants suitable as a food source are located in the project area.

Brown Pelican

5.87 State-listed as an endangered species, brown pelicans feed along the U.S. coast in shallow estuarine waters, using sand spits and offshore sand bars as daily resting and nocturnal roosting areas (BTNEP 2007). Brown pelican nesting colonies are found on small, off-shore islands protected from mammalian predators where nests are built in mangrove trees or other shrubby vegetation. The brown pelican was extirpated from Louisiana in 1963 as a result of exposure to pesticides and was reintroduced between 1968 and 1980 (USFWS 2007a). Population productivity peaked in Louisiana in 2004, when 16,501 nesting pairs produced 39,021 fledglings. During 2005, an oil spill, tropical storms, and hurricanes resulted in reduced productivity and substantial loss of habitat, especially east of the Mississippi River. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance (BTNEP 2007). Brown pelicans are common in the project vicinity, and are likely to use the area for foraging and feeding.

Piping Plover

5.88 Federally and state-listed as a threatened species, the piping plover's winter range includes the southern coast of Louisiana. The plover is an active forager for aquatic invertebrates along beaches and mudflats of barrier islands in southeastern coastal parishes (BTNEP 2007). The USFWS designated certain coastal islands within Plaquemines Parish as critical habitat for the wintering piping plover (USFWS 2001 [*Federal Register*: July 10, 2001 (Volume 66, Number 132)]). Critical habitat areas include: Unit LA-5: Timbalier Island to East Grand Terre Island; 5,735 acres in Terrebonne, Lafourche, Jefferson, and Plaquemines Parishes; Unit LA-6: Mississippi River Delta; 259 acres in Plaquemines Parish, Louisiana; Unit LA-7: Breton Islands and Chandeleur Island Chain; and 7,700 acres in Plaquemines and St. Bernard Parishes, Louisiana. Although there is designated critical habitat for the wintering piping plover within Plaquemines Parish, the Proposed Action would not occur in any area of critical habitat for the species.

Peregrine Falcon

5.89 Peregrine falcons feed primarily on medium-sized birds to waterfowl; however, rarely or locally, small mammals, lizards, fishes, and insects may be consumed (BTNEP 2007). The

species nests on cliffs and ledges; however, formerly in Louisiana, the falcon nested in cavities of large, old trees (BTNEP 2007). Artificial, man-made nest sites include tall buildings, bridges, rock quarries, and raised platforms. When not breeding, peregrine falcons forage in areas of concentrated prey, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports (BTNEP 2007). Formerly, the species bred in Kansas, Arkansas, northeastern Louisiana, Tennessee, northern Alabama, and northwestern Georgia (Snyder and Snyder 1991). Inland, peregrines inhabit open plant communities, such as grasslands and meadows, usually near rivers or lakes. They are found in mixed deciduous and coniferous forests of the eastern and southeastern U.S. Throughout their range they inhabit open forests, usually being found near large openings and along forest edges near water (Snyder and Snyder 1991). In Louisiana, the peregrine falcon inhabits the Pontchartrain, Barataria, Terrebonne, Mississippi, Mermentau, Calcasieu, and Sabine River basins (BTNEP 2007).

Bald Eagle

5.90 On July 09, 2007, the bald eagle was removed from the Federal ESA (USFWS 2007b [*Federal Register*: (Volume 72, Number 130)]). Only bald eagles located in central Arizona are protected as "threatened" under the ESA. However, the bald eagle remains protected under the MBTA of 1918 and the Bald and Golden Eagle Protection Act of 1940, and is listed as state-endangered by the LNHP (LDWF 2008a). Bald eagles inhabit forested wetlands, riparian zones, rivers, streams, and other open bodies of freshwater, as fish compose the major portion of their diet, although the species has been known to feed on carrion. Breeding habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, and seabirds (BTNEP 2007). In Louisiana, bald eagles mate in the fall and begin nesting and egg laying in December (BTNEP 2007). Clutch size is one to three with incubation lasting approximately 5 weeks. Juvenile eagles first fly at 10 to 12.5 weeks old and are cared for by both adults (BTNEP 2007). The LDWF documented 336 active bald eagle nests that produced 424 young birds during a 2006 to 2007 survey to determine nesting activity (LDWF 2008b). Major threats include habitat loss, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting (BTNEP 2007). No known nests occur in the project area, but bald eagles are known to use the area for foraging and feeding.

Gulf Sturgeon

5.91 The Gulf sturgeon, Federally and state-listed as a threatened species, is an anadromous fish that occurs in many rivers, streams, and estuarine waters along the northern Gulf coast between the Mississippi River and the Suwanee River, Florida (BTNEP 2007). In Louisiana, the Gulf sturgeon has been reported at Rigolets Pass, rivers and lakes of the Pontchartrain Basin, and adjacent estuarine areas. Spawning occurs in coastal rivers between late winter and early spring (*i.e.*, March to May). Adults and sub-adults may be found in coastal rivers and streams until November, and in estuarine or marine waters during the remainder of the year. Gulf sturgeons less than 2 years old appear to remain in riverine habitats and estuarine areas throughout the year, rather than migrate to marine waters. Habitat alterations, such as those caused by water control structures that limit and prevent spawning, poor water quality, and over-fishing have negatively affected this species. Critical habitat for the Gulf sturgeon occurs in Louisiana (BTNEP 2007), but none is located in Plaquemines Parish or adjacent to the project corridor.

Pallid Sturgeon

5.92 Federally and state-listed as an endangered species, the pallid sturgeon is one of the most poorly known and infrequently recorded freshwater fishes in North America. It inhabits large rivers and apparently prefers main river channels of excessively turbid rivers in areas with strong currents over firm sandy bottom. In Louisiana, the pallid sturgeon was formerly thought to be restricted to the main channel of the Mississippi River. Recent data indicate that the species also exists in the Atchafalaya River (BTNEP 2007). Pallid sturgeons have been documented in the Mississippi River as far south as Donaldsonville, but likely occur below New Orleans and in the project area, albeit at relatively low numbers (Kirk et al. 2008b).

Sea Turtles

5.93 All species of sea turtles in U.S. waters are listed as endangered or threatened. The five species found in the U.S. Portions of the Gulf of Mexico are the loggerhead, green, hawksbill, Kemp's ridley, and leatherback. The most commonly found species in Louisiana are the loggerhead and Kemp's ridley, but the latter is the most endangered sea turtle worldwide. Kemp's ridley turtles nest almost exclusively in Mexico, but occasional nests have been located in Texas (McDaniel et al. 2000). Sea turtles inhabit warm bays and oceans, seagrass beds, and estuaries. Mainland beaches and islands are utilized for nesting. The leatherback tends to inhabit deeper waters. The loggerhead regularly enters marshes, estuaries, and coastal rivers. It has been found throughout the Louisiana coastal zone, but the only recorded nesting of loggerhead in Louisiana was on the Chandeleur Islands (BTNEP 2007).

5.94 Sea turtles can migrate over vast distances, but the spatial distribution and seasonal movements of sea turtles are poorly understood. Based generally upon aerial surveys, the relative abundance of turtles sighted is higher in the eastern Gulf than in the western Gulf. The southern Florida zones apparently have a higher relative abundance of sea turtles than any other region. The west coast of Florida has sea turtle densities that are, on average, 60 times higher than in the Western Gulf, but three times lower than in the southern Florida areas. Overall densities remain high through the Big Bend region of Florida, but abundance is reduced off of the Mississippi and Alabama coasts. West of the Mississippi River, observed sea turtle abundance is extremely low, with no turtles sighted in many of the subzones. In southern Texas, average sea turtle abundance is about 20 times higher than in the other Western Gulf zones (McDaniel et al. 2000). Nearshore sea turtle abundances are proportionately higher than in offshore Western Gulf subzones, with the greatest density of sea turtles found in the 0 to 60 ft depth zone. Sea turtles could potentially occur in the saline open water habitats in the southern parts the project corridor.

RECREATIONAL RESOURCES

5.95 This resource is institutionally significant 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 significant because of the high economic value of recreational activities and their contribution to local, state, and National economies.

5.96 Plaquemines Parish provides several recreational resources available to residents and tourists. Recreational resources in the project area are publicly significant because of the high value that the public places on fishing, hunting, and boating. Large numbers of fishing and

hunting licenses and recreational boat registrations are sold in Louisiana each year. Plaquemines Parish is dependent on the Gulf of Mexico for its livelihood, and as a result, both commercial and recreational fishing are important in the area. Several fishing tournaments are held in the parish every year. The wetlands, fresh and saltwater lakes, and miles of coastline surrounding Plaquemines Parish provide habitat to a variety of fresh, brackish, and marine fishes, waterfowl, and other birds. Plaquemines Parish is located within the Mississippi Flyway and is major habitat for ducks and geese on their migrations to wintering habitat in Central America. Due to the high abundance of waterfowl, Plaquemines Parish is one of the best duck hunting locations in the Nation. The variety of habitats in the area also provides excellent bird-watching opportunities. There are several marinas, fishing supply shops, charter services, lodging, and restaurants located near the project area that support fishing and hunting tourism (Plaquemines Parish Tourism 2010).

5.97 There are two National Wildlife Refuges and one WMA located in Plaquemines Parish that offer recreational activities such as fishing, wildlife observation, photography, hunting, and camping (Figure 5-2). The Delta National Wildlife Refuge is located 10 miles south of Venice, Louisiana, along the Mississippi River and provides protection to numerous plant and animal species. In addition, it is an important wintering habitat and staging area for numerous waterfowl and other bird species (USFWS 2010a, USFWS 2010b). Breton National Wildlife Refuge includes Breton Island and the Chandeleur Islands, which provides and protects barrier island habitat and associated species. Pass a Loutre WMA is accessible only by boat and is located at the mouth of the Mississippi River in southern Plaquemines Parish. In addition to hunting and fishing, Pass a Loutre WMA offers an annual trapping program to control surplus furbearing animals and alligators (LDWF 2010). There are no Wild or Scenic Rivers in Plaquemines Parish.

5.98 Fort Jackson is a decommissioned fort and a Civil War battle site located approximately 2.5 miles south of Triumph, Louisiana (NPS 2010) (Figure 5-2). It is a National Historic Landmark and a historical museum owned and operated by Plaquemines Parish. However, it was severely damaged in Hurricane Katrina and is currently closed to the public. Access to view the fort from the surrounding road is still possible, as the roads into the fort are open. The area surrounding the fort has been maintained and, as a result, is still a popular birding and walking spot. Part of the Plaquemines Parish Long-term Community Recovery Planning includes renovating Fort Jackson for tourists and applying to become a National Park.

5.99 The recreational and cultural facilities of Plaquemines Parish include numerous outdoor facilities including the following: baseball, soccer, and football fields, basketball and tennis courts, walking, running and field event tracks, swimming pool, auditoriums, golf courses and marinas. There are also numerous parks located throughout the Parish (Plaquemines Parish 2010). The Fort Jackson Sports Stadium, which served as the football stadium for the high schools located in Buras and Boothville, Louisiana, was heavily damaged during Katrina. The parish proposes to relocate it near the new consolidated South Plaquemines High School so it would be better suited for the needs of the parish and would not interfere with the tourism potential for the fort. Plaquemines Parish also hosts a variety of fishing tournaments, in addition to the Seafood and Orange Festivals.

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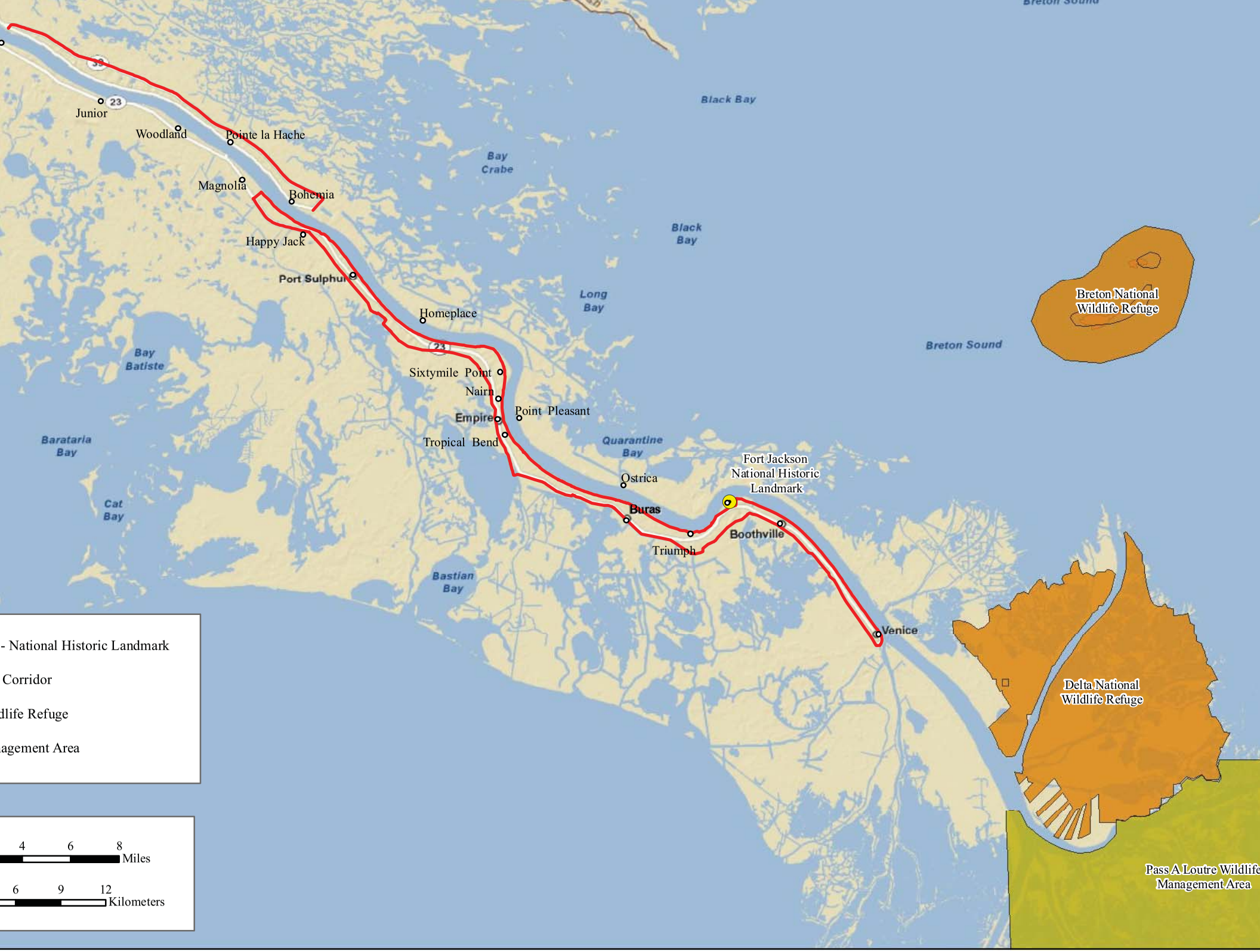
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Black Bay
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Barataria Bay
Cat Bay
Bastian Bay
Quarantine Bay
Junior
Woodland
Pointe la Hache
Magnolia
Bohemia
Happy Jack
Port Sulphur
Homeplace
Sixtymile Point
Nairn
Point Pleasant
Empire
Tropical Bend
Ostrica
Buras
Triumph
Fort Jackson National Historic Landmark
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CULTURAL RESOURCES

5.100 This resource is institutionally significant because of Section 106 of the National Historic Preservation Act (NHPA) 36 CFR Part 800 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 significant because of their association or linkage to past events, to historically important persons, to design and/or construction values, and for their ability to yield important information pertaining to prehistory and history. Cultural resources are publicly significant because preservation groups and private individuals support their protection, restoration, enhancement, or recovery.

Cultural Background of Project Area

5.101 The exact timing of human presence in North America is a subject of considerable debate among scholars. Although some scholars cite evidence that would suggest an earlier presence, the general consensus among archaeologists based on datable archaeological evidence in contexts with credible integrity suggests that humans were in North America by the end of the Late Pleistocene epoch 11,200 years B.P. to 10,900 B.P. (Grayson 1993; Taylor et al. 1996; Beck and Jones 2007). Since that period, sea level has risen, inundating previous coastlines, and the avulsion of the Mississippi River has altered its course and location of its outlet to the Gulf of Mexico periodically. Most of the Gulf coast of Louisiana is testimonial to this alluvial fluctuation with multiple relict deltaic lobes, barrier islands, bays, coastal marshes, lakes, bayous, and channels along its length. Most of Plaquemines Parish has been formed by the most recent fluctuation in the river's course, and combined with sea-level rise, has deeply covered any remains of the early- to mid- Holocene coastal environment. The landscape of Plaquemines Parish is relatively young geologically, compared with northern and western portions of Louisiana. The landscape is predominantly a deltaic formation formed from alluvial sediment accumulation at the mouth of the Mississippi River. The modern course of the Mississippi River was generally in place around New Orleans as early as 1,200 years ago with the modern delta formation accumulating younger sediments progressively outward to form the "bird's foot" delta, which we observe today (Saucier 1974).

5.102 Human exploitation of coastal resources and habitation of the northern reaches of the modern delta would have only been possible starting after 1,200 B.P. Until recently, human settlement in the area has been subject to frequent flood events and fluctuation in the landscape morphology. Preventing the natural tendency for the Mississippi River to shift its course has become a science of modern humans to protect the current settled populations, commerce, transportation corridors, industrial facilities, and oil and gas exploration/extraction operations along its length. Large scale public works projects (levee construction, spillways, pumps, *etc.*) have been constructed to stabilize the current river channel. Despite human efforts to control this landscape, the local geomorphology of the area remains in constant flux particularly from coastal subsidence, floods, and storms. The recent storm events of Hurricanes Katrina and Rita underscore how fragile human control over this landscape remains.

5.103 The cultural manifestations that occurred during the Paleo-Indian Period (11,500 B.P. to 9,000), the Archaic Period (9,000 to 2,600 B.P.), and the earlier portion of the Ceramic Using Culture Period (2,600 B.P. to 1,300 B.P.) that occurred elsewhere in Louisiana, pre-date the existence of the landscape in the current project area of Plaquemines Parish. The earliest

evidence for human activity in what is now Plaquemines Parish is the Coastal Troyville – Coles Creek culture which has been dated to approximately 1,600 B.P. and persists through around 1,000 B.P. The cultural period is so named as it represents a transitional period from Coastal Troyville to Coles Creek. The similarities in cultural characteristics, particularly ceramics, are nearly indistinguishable for this period (Jeter and Williams 1989a). Four sites, 16PL25, 16PL26, 16PL30, and 16PL31, all located farther north than the current project area in older portions of the delta in Plaquemines Parish, date to this period (Neuman 1977). The sites are oyster and Rangia clam (*Rangia cuneata)* midden deposits with pottery associated with this time period (Neuman 1977). Settlements during the Troyville - Coles Creek period consist of small foraging camps to moderate sized hamlets and even larger village and mound sites (Jeter and Williams 1989a). Troyville - Coles Creek peoples appear to have largely been a foraging society, subsisting on a diverse array of resources including fish, birds, small and large mammals, reptiles, amphibians, with seemingly extensive focus on shell-fish such as oyster and Rangia clam (Jeter and Williams 1989a). The exploitation of shellfish may seem more pronounced due to the large amount of waste product (shells) associated with the particular resource and the durability of the material to survive in the record; nonetheless, coastal and aquatic resources were likely abundant in the local paleoenvironment of the period. In addition to faunal materials, Coastal Troyville - Coles Creek people exploited a variety of wild floral species including *Chenopodium* an indigenous starch domesticated elsewhere in the southeastern U.S. Maize, beans, and squash were cultivated at more inland sites at this time period but have not been found in quantities suggesting a focus for the Coastal Troyville - Coles Creek period (Jeter and Williams 1989a). The seeming lack of focus on domesticates may have been due in part to a limited availability of arable land or such a natural abundance of other resources rendering agricultural efforts unnecessary.

5.104 The Coles Creek period (1,300 to 1,000 B.P.) was most pronounced farther north in Louisiana, but the greater expression and distinction of this culture period appears at larger sites in coastal areas. The Coles Creek culture is distinguished by larger sedentary villages, larger ceremonial complexes with sub-structural pyramidal mounds, and ceramics decorated with encircling incised lines (Jeter and Williams 1989a).

5.105 After 1,000 B.P., in the coastal area that includes Plaquemines Parish, the Coles Creek cultural complex slowly transitioned into the Plaquemine culture from 1,000 to 500 B.P. The Plaquemine culture appears to have been greatly influenced by Mississippian culture which flourished farther north in the Mississippi River valley along its tributaries and eastward as far as Florida around the same period. This influence has been surmised as being due to the north-to-south connectivity of waterways and likely ease of trade. The Plaquemine culture is characterized mostly by stylistic aspects of its ceramic tradition, but also by increased social complexity with large villages forming major centers surrounded by multiple sub-centers of smaller order. Increased construction of ceremonial complexes with mounds arranged around central plazas occurred as well as an increased reliance on maize agriculture (Jeter and Williams 1989b). In the coastal area including what is now Plaquemines Parish, the full manifestation of the Plaquemine culture period is more subdued with village sizes remaining relatively small and a continued pronounced reliance on natural coastal resources (Jeter and Williams 1989b). Three sites in the vicinity of the project area have been attributed to this period. The Adam's Bay Site (16PL8), the Buras Mounds Site (16PL13), and the defunct Pointe á la Hache Site (16PL12).

According to Louisiana Site Records Forms, the Adam's Bay Site and Buras Mounds were the most expressive of Plaquemine culture sites containing mound groups of three and four mounds, respectively, consisting of shell and earth with Plaquemine period ceramics. Both 16PL8 and 16PL13 are well outside and west of the ROW for the current project. The Pointe á la Hache site was historically adapted to support the St. Thomas Chapel and later destroyed with levee construction. Another prehistoric mound site reported in the vicinity of the project is Grand Bayou Site (16PL34), although this site has not been relocated in recent years and other than a vague description of consisting of dredged shell on the bank of Grand Bayou, its affiliation is uncertain.

5.106 The Mississippian (1,000 to 300 B.P.) cultural influence in the coastal region is marked by the occurrence of ceramics bearing the stylistic tradition associated with that period's expression. The inhabitants of the coastal region appear to continue their reliance on the abundant natural subsistence resources of the region augmented with occasional horticultural and agricultural pursuits up until the arrival of Euro-American exploration and settlement (Jeter and Williams 1989b).

5.107 The effects of the initial European exploration of the Americas were likely felt in the project area long before the first Europeans set foot in the area. Through the intricate trade networks in existence through the southeast of the continent, it is likely that news of the first contact travelled throughout the region along with foreign communicable diseases and trade items. The initial period of European exploration of the region was sporadic with major periodic gaps in contact events. This intermittent period of European incursions into the region has come to be called the Protohistoric Period. Early European exploration of the region may have either directly or indirectly affected the local population, but the native political entities were left to their own devices and traditional life ways carried on. Documentation of native groups during the Protohistoric Period is patchy at best, with many discontinuities likely compounded by the political and ethnic flux occurring between visits and inconsistencies among interpretive descriptions by multiple European observers.

5.108 The first Europeans to enter the region were De Soto's entrada in 1541. Most of the De Soto expedition took place farther to the north, but the remnants of his army passed through what existed of the project area on their way down the Mississippi River to the Gulf of Mexico following his death. It is not known if and where the Spanish force made landfall in the lower Mississippi delta. It is uncertain what cultural group they would have encountered if they had made landfall during their exodus from the region. An influx of Mississippian people or influence occurred in the coastal region during this period with ceramic stylistic resemblance to Yazoo Basin groups and the Pensacola complex of western Florida and west-central Alabama (Jeter 1989). This later Mississippian influence appears to have replaced the previous Plaquemine cultural tradition in some areas although the Deltaic Natchez, a Protohistoric Plaquemine manifestation, may have persisted in the delta (Jeter 1989). Evidence for the presence of these groups is sparse and comes from neighboring areas outside of the project area.

5.109 Over 140 years would pass after the De Soto entrada until the next documented European foray into the region surrounding the project area. This time it was the French led by Sieur La Salle in 1682. The La Salle expedition was a follow up of earlier French exploration efforts

down the Mississippi river from Canada where they had considerable control over the land. Previous exploration had reached as far south as Arkansas. The French were interested in securing fur trading relationships with the Natives of the interior of the continent and cutting off Spanish expansion from Mexico and Florida (Williams 1989). The ill-fated La Salle party facing starvation, disease, and the eventual murder of La Salle descended the Mississippi to the Gulf of Mexico pausing somewhere near the mouth to erect a wooden cross, and claimed the entire river valley in the name of King Louis XIV, hence Louisiana (Williams 1989).

5.110 The La Salle expedition was followed by the Le Moyne brothers in 1698. Pierre Le Moyne, Sieur d'Iberville the eldest and leader of the party and Jean-Baptiste Le Moyne, Sieur de Bienville II continued the exploration of the region with the goal of establishing settlements to secure France's land claim. The Iberville expedition established a settlement at Biloxi, Mississippi and ascended the Mississippi River from the rediscovered mouth to the confluence of the Red River. The expedition also explored Lakes Maurepas and Pontchartrain. On the return trip, Bienville encountered a British exploratory force ascending the Mississippi downriver from modern day New Orleans and was able to convince them to leave. The bend in the river where this confrontation took place continues to be called English Turn. To dissuade future incursions, the French built a fort below English Turn in 1700, believed to be somewhere in the vicinity of present day Phoenix, Louisiana (Williams 1989). Archaeological site 16PL27, Fort de la Boulaye, discussed later, is the presumed location of this fort, although no *in situ* archaeological evidence supports this presumption. For over a decade, the fort and its military detachment, including support personnel, remained the only French settlement on the lower Mississippi River (Williams 1989). Continued attempts to protect the French colonial settlements during the 1700s included the construction of several more forts: Fort Balize, at the mouth of the river; Fort Plaquemine and Fort Bourbon on either side of the river at Plaquemine Bend; and another pair, Fort St. Leon and St. Mary flanking the banks at English Turn (Greene 1982). At this time of more regular European contact, two small tribes lived in the area that would be called Plaquemines Parish, the Chawasha and the Washa. Both tribes were linguistically related to the larger Chitimacha tribe located to the west. After a series of conflicts with the French and British in the early 1700s, both tribes abandoned the area and moved westward and seem to have avoided further mention in the historic record (Davis et al. 1979).

5.111 In an effort to increase economic development and settlement, the French chartered private entrepreneurs to set up operations in the Louisiana colony. Antoine Crozat and, later, John Law's company were successful in establishing a series of trading posts around the lower Mississippi River for trading with the Native Americans. Many of these trading posts served as the nuclei for some of the first settlements in the area including French, German, and Native American settlers (Williams 1989). The settlement of New Orleans was laid out in 1718 and later became the capital of the colony in 1722.

5.112 The initial French settlement of Louisiana was focused on trade, particularly fur, with Native Americans with some subsistence farming to support the population. Later settlers included more well-to-do planters, introducing the Plantation system to the fertile river floodplains and natural levees of Louisiana. Although African slaves came as early as the Europeans to Louisiana territory, the demand for slaves increased with the introduction of the plantation system to become a significant part of the labor force. Slavery was not limited to the

plantation system alone, with wealthier small farms and other industrial activities also employing slave labor. The slave trade became a major economic enterprise unto itself and the institution of slavery remained a part of the Louisiana socio-economic system through the French and later Spanish and Anglo-American regimes until its abolition during the American Civil War. It is unknown how many Africans lost their lives through the capture and transport to the U.S.; however, by the end of the Civil War nearly 4 million African slaves were freed from bondage Nationwide with 331,726 in Louisiana alone. African Americans continue to make up a large percentage of the cultural diversity in Louisiana (University of Virginia Library Historical Census Browser 2008).

5.113 Acadian refugees of French descent, forcibly removed from their settlements in Nova Scotia, Canada following the 1763 French defeat in the Seven Years War, also known in the U.S. as the French and Indian War, joined their French brethren in Louisiana territory in the mid-1700s. The Acadians were displaced and distributed all over the eastern seaboard and Louisiana territory; however, in the area that came to be the State of Louisiana, they initially settled available lands along the natural levees and floodplains in the south, but eventually sold these lands to planters, opting for a subsistence lifestyle adapted to smaller bayous and swamps. The Acadians came to be known as Cajuns and continue to have a distinctive influence on the cultural identity of Louisiana (Williams 1989).

5.114 Louisiana territory was given to Spain in 1763 as payment for Spanish participation on the side of France versus the English during the Seven Years War. Despite Spanish control over the territory, the French cultural identity remained dominant and was even assimilated by the Spanish administration (Williams 1989). An attempt to increase Spanish numbers and influence over the territory included the immigration of Isleños from the Canary Islands, but they too assimilated toward the French culture. Other ethnic groups entering the Louisiana territory during the French and Spanish administrations included Germans, Filipinos, and Anglo-Americans (Williams 1989).

5.115 Indigo was the primary cash crop in Louisiana until its failure in the late 1700s. Sugar and rice replaced indigo as a cash crop in southern Louisiana and Plaquemines Parish. Cattle, sheep, and oranges were also major products of Plaquemines Parish during the French and later Spanish periods (Maduell 1972, Robichaux 1973).

5.116 Spanish control over Louisiana territory lasted until 1800 when Spain ceded Louisiana west of the Mississippi to Napoleonic France in the Third Treaty of San Ildefonso. The treaty was conducted in secret to keep foreign speculation regarding French affairs in the Americas minimal in so far as the Spanish flag was still flying in New Orleans and St. Louis when the U.S. negotiated the Louisiana Purchase from France in 1803 (Barry 1973; Chidsey 1972).

5.117 Despite the transfer of Louisiana territory from the French to the U.S., the French and, to a lesser extent, Spanish heritage lingers prominently in the portion of the territory that is now the state of Louisiana. French culture remains visible in the landscape from toponyms, with the persistence of property boundaries configured according to the French arpent land survey system along watercourses, architecture, cuisine, Catholicism, festivals and celebrations such as Mardi

Gras, a dwindling number of language speakers, and the great many people bearing French and Spanish surnames.

5.118 Interest in the Louisiana territory had been growing in the newly independent U.S. by the turn of the 19th century. American settlers west of the Appalachian Mountains found transporting their goods to market via the Mississippi River and tributaries to be far easier and faster than hauling them by wagon back over the mountains. Additionally, having a foreign power, Spanish, French or otherwise, on the western doorstep of the new nation presented both a possible threat to security and a limit to future expansion (Williams 1989). In 1803, the Jefferson administration negotiated the Louisiana Purchase from France, including all lands west of the Mississippi River contained by its tributaries that fall east of the Rocky Mountains, thereby doubling the size of the young Nation.

5.119 Some dispute over the boundaries of the purchased territory remained with the Spanish regarding West Florida and southwestern Louisiana. These disputes were lingering details not fully resolved between the earlier French and Spanish transfer of Louisiana territory (southwestern Louisiana) and the British to Spanish cessation of West Florida (Wall et al. 1990; Williams 1989). The influx of Anglo-American settlers into the region eventually led to a breakdown in Spanish control of these disputed areas and eventual cessation of the lands to the U.S. Most notable of these boundary disputes was the rebellion that led to the short-lived West Florida Republic where Anglo-American settlers rose against the Spanish rulership and established the West Florida Republic. Portions of the republic were annexed 90 days later into Louisiana and Mississippi territory of the U.S. (Wall et al. 1990). The Adams-Onis Treaty, signed in 1819, put to rest the uncertain boundary between southwest Louisiana and Spanish-controlled Texas (Wall et al. 1990).

5.120 The State of Louisiana was admitted as the 18th state in the U.S. in 1812. The first governor, William C.C. Claiborne, was put to task almost immediately in preparing for war as British/American relations deteriorated. Louisiana's defenses still consisted of the forts constructed by the French in the early 1700s and variously maintained by the Spanish later that century. All the forts were in poor shape, if not totally destroyed, by frequent storm and flood events. Fort St. Phillip at Plaquemines Bend was repaired and improved, additional fortifications were constructed on the east bank at English Turn, and an attempt to build a new fort at the Balize was abandoned before completion (Greene 1982).

5.121 The war of 1812 did not reach Louisiana until December 1814, around the time the Treaty of Ghent was being signed to end the war. The British mounted an offensive to take New Orleans with a two-pronged attack. A land force marched through St. Bernard Parish toward Louisiana while warships sailed up the Mississippi River. The British land forces were defeated by U.S. forces led by Andrew Jackson at the Chalmette battlefield, 5 miles south of New Orleans. The British attacked Fort St. Phillip at Plaquemines Bend on January 9, 1815. The British ships were repulsed after 10 days of shelling the fort, ending the British attempt to take New Orleans. Word that the war was over finally reached the British forces in February (Thayer 2006; Wall et al. 1990). Following the war, construction began across the river from Fort St. Phillip to replace the decrepit French/Spanish hold over Fort Bourbon. The new fort, Fort

Jackson, was designed to improve the Mississippi River defenses by cross-firing with Fort St. Phillip (Greene 1982).

5.122 During the early half of the 19th century, Plaquemines Parish continued to grow. Sugar, rice, and citrus plantations were the dominant economic enterprise with smaller industries of vegetable farming, fishing, and oyster harvesting (De Bow 1847). Although growth continued, repeated flooding caused occasional setbacks. Development of Plaquemines Parish tended to follow levee construction downriver.

5.123 The Civil War climaxed quickly for southernmost Louisiana and Plaquemines Parish. After Louisiana seceded from the Union in 1861, Union ships were quickly stationed to blockade the mouth of the Mississippi River. An initial attempt in October 1861 was successful in temporarily removing the Union blockade ships. In April 1862, the Union returned in force and ascended the Mississippi River. On April 18, 1862, Union ships commanded by Flag Officer David G. Farragut commenced the bombardment of Fort St. Philip and Fort Jackson. After 6 days of bombardment and tactical maneuvering, the Union ships continued upriver and engaged with a disorganized Confederate fleet. The Union defeated the Confederate fleet and continued on to capture New Orleans (Davis 1881). For the rest of the war, inhabitants of Plaquemines Parish had to contend with raiding parties of Union troops looting food and valuables. The liberation of slaves drastically reduced the labor force plantation owners had relied upon rendering most plantations inoperable (Davis 1881: Wall et al. 1990; Wilds et al. 1996).

5.124 The economy of Plaquemines Parish was slow to recover following the Civil War and succeeding Reconstruction period. Frequent hurricanes and yellow fever epidemics further depressed the parish. The plantation system collapsed with only Magnolia, Belair, and Braithwaite continuing to operate into the 20th century. Many former slaves became integrated into the new economy, buying or renting small farms or working as hired farm hands or in various support industries. Rice became the more dominant crop of choice as the disrepair of levees allowed frequent flooding, limiting areas where sugarcane could be successfully grown. The transition to rice farming brought many Chinese immigrants to the area, hired for their skill in rice cultivation. The Chinese also introduced another industry to the parish that included growing vegetables and fruit trees. This market gardening or "truck farming" was further enhanced by the construction of a railroad from Bohemia on the east bank and Fort Jackson on the west bank to New Orleans and beyond. Railroads allowed farmers to ship their fresh produce upriver to markets before spoilage, making the industry profitable. Additionally, the rise in the popularity of canned foods brought several canneries to the parish and an increase in the commercial fishing and oyster harvesting industry.

5.125 After the turn of the century, rice cultivation shifted to southwestern Louisiana, as market gardening became more prevalent in Plaquemines Parish. The seafood industry continued to play an important role in the economy as it does today. The discovery of oil, gas, and sulfur in Plaquemines Parish and the near-shore areas of the Gulf of Mexico brought the petro-chemical industry to the parish which continues to play a major part in the local economy.

Previous Investigations

5.126 Most of the development in the project area has occurred along the narrow, less than 1-mile-wide strip of dry land on either side of the Mississippi River channel. At the time of writing, 46 cultural resource surveys that have occurred within 1 mile of the proposed project corridor sections were on record at the Louisiana Division of Archaeology (LDA) (Table 5-10). These surveys were conducted in support of various projects including developing the landscape, maintaining and upgrading infrastructure, supporting industrial endeavors, pursuing academic research, and of particular relevance to this project, constructing the existing NOV risk reduction levee. Since the inception of the NOV Hurricane Protection Project by the Flood Control Act of 1962, 37 surveys have been conducted for the CEMVN in the project area and 15 specifically in support of projects resulting in the existing levee protection footprint in the project area. These particular 15 surveys are summarized below. For more information pertaining to these surveys and others within 1 mile of the project area, refer to the citations for those particular documents in Table 5-10 and reference section.

Table 5-10. Cultural Resource Investigations within 1 Mile of NOV Hurricane Risk Reduction Levee Projects

State Survey Number	Year	Survey Report Title	Author/Agency
22-61	1976a	Cultural Resources Survey of the Port Sulphur Levee Enlargement and Setback Mississippi Levees, Buras Levee District Item M-41.7-R Plaquemines Parish, Louisiana.	J. Richard Shenkel Ph.D. for USACE, CEMVN
22-157	1976b	Cultural Resource Survey Myrtle Grove Bank Protection Plaquemines Parish, Louisiana.	J. Richard Shenkel Ph.D. for CEMVN
22-158	1976c	Cultural Resources Survey Empire Lock Forebay and Levee Setback Plaquemines, Parish, Louisiana.	J. Richard Shenkel Ph.D. for CEMVN
22-161	1976d	Cultural Resource Survey of Gravolet Plaquemines Parish, Louisiana.	J. Richard Shenkel Ph.D. for CEMVN
22-328	1978	Cultural Resource Survey of Grand and Tiger Passes and Baptiste Collette Bayou Plaquemines Parish, Louisiana.	Gagliano et al., Coastal Environments, Inc. for CEMVN
22-781	1977a	Cultural Resources Survey of the Homeplace Levee Enlargement and Slope Pavement (Phase II) Mississippi River Levees, Buras Levee District Item M-37.7-R Plaquemines Parish, Louisiana	J. Richard Shenkel Ph.D. for CEMVN
22-334	1977b	Cultural Resources Survey of the Point Michel Revetment Item MI. - 46.0 to 42.0 R Plaquemines Parish, Louisiana.	J. Richard Shenkel Ph.D. for CEMVN
22-408	1978	Cultural Resources Survey of a Protection Levee Around Fort Jackson, Plaquemines Parish, Louisiana.	George Castille of the Division of Archaeology and Historic Preservation, Office of Program Development, Department of Culture, Recreation and Tourism for the Plaquemines Parish Commission Council

Table 5-10, continued

State Survey Number	Year	Survey Report Title	Author/Agency
22-430	1978	Cultural Resources Survey New Orleans to Venice Hurricane Protection Levee Reach A.	Davis et al., Department of Anthropology, Tulane University for CEMVN
22-542	1979	A Cultural Resources Survey of the Empire to the Gulf of Mexico Waterway.	Gagliano et al., Coastal Environments, Inc. for CEMVN
22-560	1979	An Archaeological and Historic Survey of the Lowermost Mississippi River: Cultural Resources Survey, New Orleans to Venice Hurricane Protection Levee: East Bank Barrier Levee Plan.	Davis et al., Department of Anthropology, Tulane University for CEMVN
22-733	1982	Cultural Resources Survey of Fourteen Mississippi River Levee and Revetment Items, Plaquemines Parish, Louisiana.	A. G. Garson, Iroquois Research Institute for CEMVN
22-671	1982	Cultural Resources Survey of Three Mississippi River Levee and Revetment Items, Plaquemines Parish, Louisiana.	J. D. Hartley and G. Garson, Iroquois Research Institute for CEMVN
22-758	1982	Level I Cultural Resources Reconnaissance Survey of Proposed Magnolia Coal Terminal Facility Plaquemines Parish, Louisiana.	Richard C. Beavers, Teresia R. Lamb and Gary B. DeMarcay for Magnolia Coal Terminal
Not Available	1982	Cultural Resources Survey of Reaches B-1, B-2, and C.	J. W. Muller and T. Flayharty for CEMVN
22-785	1982	Report on the Level II Archaeological Survey of Magnolia Plantation Plaquemines Parish, Louisiana.	R. C. Goodwin and J-K Yakubik, R. Christopher Goodwin and Associates for CEMVN
22-850	1983a	An Archaeological Survey of the Proposed Venice Revetment (M-18.7 to 10.5-R), Plaquemines Parish, Louisiana.	David R. Stuart and Jerome A. Greene, National Park Service, Denver Service Center, Southeast-Southwest Team For CEMVN
22-848	1983b	An Archaeological Survey of the Proposed Bayou Lamoque Revetment (M-33.5 to 32.1-L), Plaquemines Parish, Louisiana.	David R. Stuart and Jerome A. Greene, National Park Service, Denver Service Center, Southeast-Southwest Team For CEMVN
22-870	1983	Archaeological Survey of the New House Site Harlem Plantation, Plaquemines Parish, Louisiana.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-873	1983	An Electronic Survey of the Pointe á La Hache Saltwater Weir A Prototype Feature within the Mississippi River Ship Channel - Gulf to Baton Rouge Deep Draft Project.	John W. Muller for CEMVN
22-914	1984	Survey of Selected Civil War Naval Engagement Sites in the Area of Fort St. Philip and Fort Jackson, Plaquemines Parish, Louisiana.	Allen R. Saltus, Jr. with a grant from the US Department of the Interior and Office of Cultural Development, Department of Culture, Recreation and Tourism

Table 5-10, continued

State Survey Number	Year	Survey Report Title	Author/Agency
22-959	1984	An Archaeological Survey of the Proposed Myrtle Grove to Junior Revetment Project (M-55.7-57.2R) Plaquemines Parish, Louisiana.	Shafer et al., National Park Service, Denver Service Center, Southeast-Southwest Team For CEMVN
22-976	1985	Cultural Resources Survey of Five Mississippi River Levee and Revetment Items.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-986	1982	A Technical Report on a Methodological Evaluation of Instrumental Search in the Lower Mississippi River Venice, Louisiana to the Gulf of Mexico.	E. G. Garrison and J. G. Baker, Texas A&M Research Foundation for CEMVN
22-1022	1985	Deep Draft Report A Survey of the Underwater Portions of the Baton Rouge to the Gulf Segment, Including Supplement II to the Mississippi River, Baton Rouge to the Gulf EIS.	J. W. Muller
22-1162	1986	Archaeological Research to Locate and Identify the French "Fort on the Mississippi" 16PL27 (1700 - 1707), Plaquemines Parish, Louisiana.	M. D. Jeter and R. C. Goodwin, R. Christopher Goodwin and Associates for CEMVN
22-1187	1986	Cultural Resources Survey of the New Orleans to Venice Hurricane Protection Project, Reach C Enlargement, Plaquemines Parish, Louisiana.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-1274	1988	Final Report of Cultural Resource Investigations within the U.S. Army Corps of Engineers New Orleans to Venice Hurricane Protection Project.	Montgomery et al., Agency of Conservation Archaeology for CEMVN
22-1294	1990a	A Research Design for Cultural Resources Investigations in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana.	D. G. Hunter and S. K. Reeves, Coastal Environments, Inc. for CEMVN
22-1312	1990b	Cultural Resources Investigations in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana: The Proposed Homeplace and Tropical Bend Borrow Areas.	D. G. Hunter and S. K. Reeves, Coastal Environments, Inc. for CEMVN
22-1353	1989	Cultural Resources Investigations in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana: The Proposed Solari Borrow Area.	Dennis Jones, Museum of Geoscience Louisiana State University, Baton Rouge for CEMVN
22-1411	1989	Assessment of Aesthetic Impacts on Fort Jackson, A National Historic Landmark located in Plaquemines Parish, Louisiana.	Cultural Recreation Section, Planning Division, CEMVN
22-1435	1989	Cultural Resource Investigations of Three Borrow Areas, New Orleans to Venice Hurricane Protection Project, Plaquemines Parish, Louisiana.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-1498	1990	Cultural Resource Investigations of the Citrus Lands Area; New Orleans to Venice Hurricane Protection Project, Plaquemines Parish Louisiana.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-1515	1992	Archaeological Surveys and Evaluations of Four Construction Areas in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana.	D. G. Hunter, Coastal Environments, Inc. for CEMVN

Table 5-10, continued

State Survey Number	Year	Survey Report Title	Author/Agency
22-1576	1991	A Report of a Level II Archaeological Field Investigation of the Freeport Sulphur Borrow Pit - C.L. Dill Company, Port Sulphur, Louisiana, Plaquemines Parish.	Richard C. Beavers, Teresia R. Lamb and Gary B. DeMarcay for C.L. Dill Company
22-1663	1994	Remote Sensing Investigations of Civil War Era Shipwrecks in the Vicinity of Fort St. Philip, Plaquemines Parish, Louisiana.	Goodwin et al., R. Christopher Goodwin and Associates for CEMVN
22-2680	2005	A Phase I Cultural-Resource Survey of the Freeport-McMoRan Main Pass Energy Hub Pipeline, Plaquemines Parish, Louisiana.	R. A. Gougeon, Panamerican Consultants, Inc. for Ecology and Environment, Inc.
22-2841	2006	Reconnaissance Survey of the Proposed Citrus Lands Property Borrow Areas, Plaquemines Parish, Louisiana.	Montana et al., Earth Search, Inc. for CEMVN
22-2864	2007	Reconnaissance Survey of a Proposed Borrow Area Near Myrtle Grove, Plaquemines Parish, Louisiana.	J. Rawls and J-K Yakubik, Earth Search, Inc. for Evenstar, Kenner, LA
22-2962	2007	Phase I Cultural Resources Survey and Archaeological Inventory of the Old School Board Building, Near Pointe á La Hache, Plaquemines Parish, Louisiana.	Handly et al., R. Christopher Goodwin and Associates for Plaquemines Parish Government
22-3025	2007	Reconnaissance Survey of the Proposed Chauvin Borrow Site, Plaquemines Parish, Louisiana.	S. Nolan and D. Harlan, Earth Search, Inc. for CEMVN
22-3030	2008	Phase I Cultural Resources Survey of a Borrow Area, Gravolet Canal Closure and Mississippi River Levee Repairs, Plaquemines Parish, Louisiana.	Smith et al., Earth Search, Inc. for CEMVN
22-3074	2008	Phase I Cultural Resources Survey of the Proposed TAC Carrere Borrow Pit, Plaquemines Parish, Louisiana.	D. Harlan and R. Smith, Earth Search, Inc. for CEMVN
22-3106	2008	Phase I Marine Archaeological Remote Sensing Survey of the Proposed Mississippi River Sand Borrow Sites for the Louisiana Coastal Area barrier Shoreline Restoration Project, Plaquemines Parish, Louisiana.	Nowak et al., R. Christopher Goodwin and Associates for CEMVN
22-3261	2009	Phase I Cultural Resources Survey of the Plaquemine Dirt and Clay Borrow Pit, Plaquemines Parish, Louisiana.	Parrish et al., Earth Search, Inc. for Cali & LaPlace Engineers, LLC, Baton Rouge, LA

5.127 In 1976, J. Richard Shenkel, Ph.D., describes finding no cultural resources in his survey of the Port Sulphur levee enlargement project area in the report, *Cultural Resources Survey of the Port Sulphur Levee Enlargement and Setback Mississippi Levees, Buras Levee District Item M-41.7-R Plaquemines Parish, Louisiana* (Shenkel 1976a). Survey methods included pedestrian and subsurface testing spaced every 50 to 150 yards on each side of the levee. This area corresponds with a portion of NOV 10 passing through the upriver part of Port Sulphur.

5.128 Farther downriver, J. Richard Shenkel, Ph.D., conducted a similar survey in 1977. In the report, *Cultural Resources Survey of the Homeplace Levee Enlargement and Slope Pavement (Phase II) Mississippi River Levees, Buras Levee District Item M-37.7-R Plaquemines Parish,*

Louisiana Survey (Shenkel 1977a), Shenkel describes finding no cultural resources during the investigation. Survey methods included pedestrian and subsurface testing spaced every 50 to 150 yards on each side of the levee. This area corresponds with a portion of NOV 10 passing through Homeplace, Louisiana, from RM 37.7 to RM 35.

5.129 In another previous investigation by Shenkel, *Cultural Resources Survey of the Point Michel Revetment Item MI. - 46.0 to 42.0 R Plaquemines Parish, Louisiana* (Shenkel 1977b), no cultural resources were discovered. The area covered in the investigation corresponds to NOV 09 and the most upriver portion of NOV 10 through the town of Happy Jack. Survey included pedestrian and subsurface testing spaced every 50 to 150 yards on each side of the levee.

5.130 In 1978, Davis et al. of the Department of Anthropology at Tulane University surveyed the Reach A section of the NOV Hurricane Protection Levee. Reach A is the back levee on the Mississippi West Bank stretching between Happy Jack and Tropical Bend, Louisiana corresponding with NOV 06 of the current project. Survey methods included pedestrian survey along the crown of the existing levee providing a "binocular view" of the project area, a boat survey traversing waterways along project corridor, survey via specialized equipment such as airboats, helicopter, or swamp buggy for difficult to access areas, and limited test excavations at any sites identified during survey. The report, *Cultural Resources Survey, New Orleans to Venice Hurricane Protection Levee, Reach A, Plaquemines Parish, Louisiana* (Davis et al. 1978) describes that no cultural resources were found in the Reach A project area.

5.131 The Davis-led survey team conducted another survey the following year (Davis et al. 1979) of the proposed MRL footprint on the East Bank from Bohemia to Baptiste Collette Bayou and on the West Bank from Plaquemines Bend to Venice. The West Bank portion of this previous survey corresponds with NOV 12 of the current project. Field survey included pedestrian survey of all dry land in the project footprint and subsurface testing at any sites found. The report, *An Archaeological and Historic Survey of the Lowermost Mississippi River, Plaquemines Parish, Louisiana*, lists 25 recorded sites including two National Historic Landmarks Fort Jackson (16PL38) and Fort St. Philip (16PL39). Of the remaining 23 sites, two sites 16PL66 and 16PL82 were considered potentially eligible for the National Register of Historic Places (NRHP). Site 16PL66, also known as Ostrica, is the site of an abandoned late-19th/early 20th century oyster factory. Dunn's Camp (16PL82) is the site of a 19th century shipbuilder's home and workshop. Both sites are located on the East Bank of the river and outside the project ROW.

5.132 Iroquois Research Institute produced a report in 1982 titled *Cultural Resources Survey of Fourteen Mississippi River Levee and Revetment Items* in which they describe the results of a 1981 survey (Garson 1982). Four of the revetment items surveyed are located within the current project area. One revetment item, "the Point Michel revetment", extends from the lower portion of NOV 09 into the upper portion of NOV 10 by the town of Happy Jack. Two additional revetment items labeled the "Port Sulphur revetment" are located along NOV 10 in two sections, one 2.3-mile section along the riverfront of the town of Port Sulphur and another 2.3-mile section along the downriver extreme of Homeplace. Another 0.9-mile-long revetment item labeled the "Tropical Bend revetment" is located near the downriver terminus of NOV 10. For each of these revetments, pedestrian and subsurface survey was conducted on the batture side of

the levee. No cultural resources were found in the revetment items corresponding to the NOV levee projects in the current investigation (Garson 1982).

5.133 In 1982, Muller and Flayharty surveyed the B-1, B-2, and C Reaches of the NOV Hurricane Protection Project (Muller and Flayharty 1982). Reaches B-1 and B-2 correspond with NOV 07, 08, 13, and 15 of the current project along the back barrier levee on the West Bank between Tropical Bend and Venice. Reach C is farther north on the East Bank forming the back barrier levee between Phoenix and Bohemia corresponding with NOV 01 and 02 of the current project. Field survey included pedestrian and bank-line survey by boat. The Muller and Flayharty 1982 report, *Cultural Resources Survey of Reaches B-1, B-2, and C*, concluded that no cultural resources were found in the study area.

5.134 In a 1983 report by David R. Stuart and Jerome A. Greene of the National Park Service, no cultural resources were found along the Venice Revetment extending from Fort Jackson to Venice, Louisiana, corresponding with NOV 12 of the current project. The report, *An Archaeological Survey of the Proposed Venice Revetment (M-18.7 to 10.5-R), Plaquemines Parish, Louisiana* (Stuart and Greene 1983a) explained that the investigation included pedestrian survey of the batture side of the levee within the project area.

5.135 The 1985 report, *Cultural Resources Survey of Five Mississippi River Levee and Revetment Items* by R. Christopher Goodwin and Associates, describes the results of survey along five separate levee sections, one of which is located in the current project area between RM 38.5 and 38 near the community of Homeplace, Louisiana. Field analysis consisted of pedestrian survey transects on the batture side of the levee resulting in the recording of two sites, 16PL131 and 16PL132. Site 16PL131 consists of a scatter of late 19th to early 20th century artifacts in association with a spoil pile from a dredged canal. Site 16PL132 consists of the remains of Old St. Patrick's Cemetery, which had been relocated behind St. Patrick's Church in 1951 in advance of a levee construction project. Neither 16PL131 nor 16PL132 were determined to possess contextual integrity and were determined not eligible for NRHP (Goodwin et al. 1985).

5.136 In support of a proposed project in 1986 to enlarge Joe Gravolet Canal, approximately 1,640 feet north of Phoenix, Louisiana, R. Christopher Goodwin and Associates surveyed an area presumed to be the location of Fort de la Boulaye, the first French fort on the Mississippi. The findings reported in *Archaeological Research to Locate and Identify the French "Fort on the Mississippi" 16PL27 (1700 – 1707), Plaquemines Parish, Louisiana* (Jeter and Goodwin 1986) explained that the location had been previously labeled as a historic landmark, despite no *in situ* physical evidence.

5.137 Through aerial photography analysis, pedestrian survey, magnetometer survey, and auger testing, R. Christopher Goodwin and Associates found no evidence for the fort in the presumed location but did find potential evidence possibly related to the fort at the Phoenix cemetery. R. Christopher Goodwin and Associates recommended that the previously presumed location of the fort be delisted as a National Landmark and that canal enlargement could proceed with archaeological monitoring (Jeter and Goodwin 1986).

5.138 In the 1986 report, *Cultural Resources Survey of the New Orleans to Venice Hurricane Protection Project, Reach C Enlargement, Plaquemines Parish, Louisiana* (Goodwin et al. 1986), R. Christopher Goodwin and Associates describes their investigation of the area proposed for enlargement of Reach C of the NOV Hurricane Protection Project. Reach C, previously reported with no cultural resources by Muller and Flayharty (1982), stretches from Phoenix to Bohemia forming the back levee along the East Bank of the Mississippi, comprising NOV 01 and NOV 02 of this project. The R. Christopher Goodwin and Associates survey recorded 23 archaeological sites and 20 structures considered to meet Louisiana historic standing structure qualifications. Three of the archaeological sites were recommended eligible for NRHP, including the Urquart Cemetery (16PL134), the Tabony Site (16PL135), and the Phoenix Cemetery (16PL146). These sites were found to not be potentially impacted by the levee construction activities. Four of the 20 structures identified by R. Christopher Goodwin were recommended eligible for the NRHP and were found to not be impacted by the proposed construction (Goodwin et al. 1986).

5.139 In 1988, the Agency for Conservation Archaeology produced a summary report, *Final Report of Cultural Resources Investigations within the US Army Corps of Engineers New Orleans to Venice Hurricane Protection Project* (Montgomery et al. 1988) of all cultural resources surveys conducted in the project area up to that date. The report provides a comprehensive synthesis of 31 previous cultural resources surveys conducted in the vicinity of the areas affected by the levee and associated flood control infrastructure construction in the NOV Hurricane Protection Project. The project area at the time now forms the existing infrastructure to be restored by the Proposed Action. The report identified 80 cultural resources sites within the vicinity of the project area, 40 of which would be directly or indirectly affected by the construction activities. Four sites, 16PL61, 16PL66, 16PL80, and 16PL82, recommended eligible for NRHP, were found to be unavoidable by the Proposed Action and if SHPO concurred with those recommendations USACE was required to have an approved data recovery plan implemented or some other mitigation measure taken. Three Historic Landmarks, Fort de la Boulaye, Fort St. Philip, and Fort Jackson were already protected by NRHP and approved mitigation measures were necessary for SHPO and also the ACHP concurrence.

5.140 In advance of proposed NOV levee construction projects in the vicinity of Fort Jackson National Historic Landmark, a 1989 study evaluated the visual impacts of the projects on the fort. The report, *Assessment of Aesthetic Impacts on Fort Jackson, A National Historic Landmark located in Plaquemines Parish, Louisiana* by the Cultural Recreation Section, Planning Division of the USACE concluded that one project involving restorations to the levee forming the eastern and southern boundary of the landmark property, which included a slight increase in height and cross-section, would not have a significant visual impact on the fort. This levee project includes the downriver length of NOV 11 and 1,640 ft of the upriver-most portion of NOV 12. Additional projects discussed in the 1989 report, which included deforestation of areas within the viewshed of the fort, were found to have a visual impact. Recommended mitigation measures included leaving a 200-ft non-clearance buffer of forest cover to protect the visual quality of background views from the fort (USACE 1989).

5.141 Another cultural resources investigation in 1990 was conducted by Coastal Environments, Inc., at two proposed borrow areas in Homeplace and Tropical Bend,

Plaquemines Parish, Louisiana. A portion of the two locations surveyed in this investigation fall within the ROW of the current investigation along NOV 06 and NOV 16. The survey consisted of a pedestrian survey supplemented with randomly placed shovel tests. One recent Euro-American occupation locale was reported, but was not considered antiquated or significant enough to be assigned a site designation. The report, *Cultural Resources Investigations in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana: The Proposed Homeplace and Tropical Bend Borrow Areas* (Hunter and Reeves 1990a), is on file at the LDA.

5.142 Coastal Environments, Inc., produced another report in 1992 titled *Archaeological Surveys and Evaluations of Four Construction Areas in the Vicinity of Fort Jackson, Plaquemines Parish, Louisiana* (Hunter 1992). The report was in support of NOV Hurricane Protection construction projects adjacent to the Fort Jackson National Historic Landmark Property following the research design devised in an earlier study by Coastal Environments, Inc. (Hunter and Reeves 1990b). Surveys included transects with shovel tests spaced at 164-foot intervals, along with metal detector scans and recovered artifacts associated with the 19th century occupation and Civil War engagement at the fort. Despite finding historic remains in the project areas, Coastal Environments, Inc. concluded that the limited remains found had been subject to substantial natural and human-induced impacts, and the evidence had limited potential to provide additional information pertaining to the occupation of the fort and as a result, no further work was recommended and construction should proceed. The area covered by these intensive surveys includes the downriver length of NOV 11 and 1,640 ft of the upriver-most portion of NOV 12.

5.143 Although many previous investigations were conducted within 1 mile of or along portions of the existing ROW of the NOV sections investigated by this project, their coverage of the proposed expanded ROW was sparse, or were designed to survey the expansion of the pre-existing levee footprint, now covered by the existing levee. In the case of some of the older reports, surveys were not performed according to the updated recommendations for Phase I field survey by the LDA. As a result, the majority of the proposed project area in this investigation still required field survey, despite the multitude of previous investigations. These previous surveys do provide a wealth of archival data collected in support of previous investigations in the project area and a strong basis for reasonable expectations pertaining to the nature of potential cultural resources encountered in the study area.

5.144 In the course of the 46 previous investigations within 1 mile of the project area and other separate site documentation efforts, 71 cultural resources sites have been reported (Table 5-11). Among the 71 cultural resource sites, four are listed with the NRHP, seven are recommended eligible for listing, 19 are considered ineligible and 41 are of unknown eligibility or require further testing. These sites will be discussed below for each project section in which they are nearest and posing the most potential for impacts.

Table 5-11. Previously Recorded Archaeological Sites within 1 Mile of NOV Levee Project Areas

Site #	NOV Levee Section within one mile	NRHP Recommended	Description	Recorder*
16PL134	01, 09	Undetermined	19th Century Cemetery	Goodwin et al. 1986, D. Harlan 2007
16PL135	01, 09	Eligible	Mid 19th - 20th Century Sugar Plantation	Goodwin et al. 1986, D. Harlan 2007
16PL136	01	Ineligible	House ruins 1930s	Goodwin et al. 1986
16PL137	01, 02	Ineligible	20th century tenant house ruin	Goodwin et al. 1986
16PL138	01	Undetermined	Bohemia Cemetery	Goodwin et al. 1986, D. Harlan 2007
16PL139	01, 09	Ineligible	Historic 20th century oil company camp	Goodwin et al. 1986
16PL139	01, 09	Ineligible	Radio tower	Goodwin et al. 1986
16PL140	01	Eligible	Bohemia Pumping Station, Early 20th Century	Goodwin et al. 1986
16PL141	01, 02	Eligible	Union Plantation Cemetery	Goodwin et al. 1986
16PL142	01	Ineligible	Late 19th - Early 20th Century Gravolet Canal Site	Goodwin et al. 1986
16PL143	01	Ineligible	Late 19th - Early 20th Century Griffin Site	Goodwin et al. 1986
16PL144	01, 02	Ineligible	Late 19th Century - present trash site	Goodwin et al. 1986
16PL145	01, 02	Ineligible	Late 19th Century cistern	Goodwin et al. 1986
16PL146	01	Eligible	Phoenix Cemetery Historic	Goodwin et al. 1986
16PL100	07, 11, 16	Eligible	Historic 1870-1919 Quarantine Lodge site	B. Clemenson 1983
16PL101	01, 02	Undetermined	Union Plantation site	B. Clemenson 1983
16PL102	01	Undetermined	19th Century Deer Range Sugar Mill Site	B. Clemenson 1983
16PL103	01, 02	Ineligible	19th - Early 20th century Bellevue Plantation	B. Clemenson 1983
16PL104	01	Ineligible	19th - Early 20th century Sophie Plantation	B. Clemenson 1983
16PL105	01	Undetermined	19th - Early 20th century Ironton Plantation	B. Clemenson 1983
16PL166	01	Undetermined	19th - Early 20th century Myrtle Grove Sugar House	R. Mann 2006
16PL157	01	Eligible	Woodland Plantation	C. Hays 1998
16PL151	06, 10	Ineligible	19th - Early 20th century trash scatter	R. C. Goodwin & Assoc. J.M Wojtala 1989
16PL152	06, 10	Ineligible	19th - Early 20th century house remains	R. C. Goodwin & Assoc. J.M Wojtala 1989
16PL131	06, 10	Ineligible	Late 19th - Early 20th Century trash scatter	P.A. Gendel 1984

Table 5-11, continued

Site #	NOV Levee Section within one mile	NRHP Recommended	Description	Recorder*
16PL132	06, 10	Ineligible	Pre-1952 Cemetery and trash scatter	T. Emerson 1984
16PL125	01	Undetermined	Undetermined brick and mortar structure ruins	D. Rhodes 1983
16PL126	01	Undetermined	Afro/Euro-American structural	D. Rhodes 1984
16PL127	05 ,09	Undetermined	Late 1800s - Present, possible Magnolia plant. assn.	D. Rhodes 1983
16PL91	11, 12	Undetermined	Possible C.S.S. Louisiana shipwreck	P. Rivet 1981
16PL92	08, 12	Undetermined	Possible C.S.S. Manassas shipwreck	P. Rivet 1981
16PL93	11,16	Undetermined	Possible Varuna shipwreck, Civil War	P. Rivet 1981
16PL94	05 ,09	Listed	Magnolia Plantation, Early 19th Century - Present	B. Clemenson 1983, S. Younts 2008
16PL95	11, 15	Undetermined	1830s-1900 Possible house ruin	A. Saltus 1983
16PL96	11, 15	Undetermined	1830s-1880 possible dock/home site	A. Saltus 1983
16PL97	11, 15	Undetermined	Possible historic shipwreck	A. Saltus 1983
16PL113	01	Undetermined	19th - Early 20th century Point Celeste Plantation	T. Emerson 1979
16PL64	06, 07, 10, 16	Ineligible	Late 19th - Early 20th Century camp site	T. Emerson 1979
16PL65	10	Ineligible	Possible historic walkway associated with canal	T. Emerson 1979
16PL66	11, 16	Undetermined	19th - Early 20th century oyster factory	T. Emerson 1979
16PL67	10,	Ineligible	19th - Early 20th century trash scatter	T. Emerson 1979
16PL68	11, 15	Undetermined	19th - Early 20th century trash scatter and cement	T. Emerson 1979
16PL69	10	Undetermined	Late 19th - Early 20th Century Tabony Cemetery	T. Emerson 1979
16PL70	10	Undetermined	19th - Early 20th century trash scatter	K. Jones 1979
16PL71	11, 14, 16	Undetermined	Late 19th - Early 20th Century rural residence	K. Jones 1979
16PL72	10	Undetermined	Late 19th - Early 20th Century oyster processing	K. Jones 1979
16PL73	10	Undetermined	Late 19th - Early 20th Century oyster processing	K. Jones 1979
16PL74	10	Undetermined	18th to Early 20th Century artifact scatter	Davis 1979
16PL75	10	Undetermined	17th - 19th Century trash scatter	Davis 1979
16PL76	10	Undetermined	Historic trash unknown age	Davis 1979

Table 5-11, continued

Site #	NOV Levee Section within one mile	NRHP Recommended	Description	Recorder*
16PL77	10	Undetermined	Historic glass scatter	K. Jones 1979
16PL78	10	Undetermined	Mid 19th - 20th Century trash scatter	K. Jones 1979
16PL79	12, 15	Undetermined	Mid 19th - 20th Century trash scatter	K. Jones 1979
16PL80	12	Undetermined	Destroyed Adolf's campsite. 175 years old.	T. Emerson 1979 S. Younts 2008
16PL81	10	Undetermined	Prehistoric/Historic Neo-Indian Scatter	J. Henderson 1979
16PL82	12	Undetermined	Late 19th - Early 20th Century home/shipyard/school	K. Jones 1979
16PL90	11,16	Undetermined	Possible Governor Moore shipwreck	P. Rivet 1981
16PL83	01	Ineligible	Possible historic dock timbers	J. D. Hartley, A. Carson 1980
16PL84	01	Undetermined	Historic material, possibly part of Harlem Plantation	J. D. Hartley, A. Carson 1980
16PL50	12	Undetermined	Possible late 19th century structure site	Gagliano and Castille 1981
16PL51	12	Undetermined	Possible late 19th century structure site	Gagliano and Castille 1981
16PL61	12	Undetermined	Standing store and fishing cabin ca. mid-1800s	Gagliano and Castille 1981
16PL48	08, 12, 15	Undetermined	Possible location of late 1800s fishing village	Gagliano and Castille 1977
16PL38	08, 11, 12	Listed	Fort Jackson	Castille 1978
16PL39	11, 12	Listed	Fort St. Phillip	M.J. Becker 1972, S. Younts 2008
16PL34	05,	Ineligible	Prehistoric unknown, shell	McIntire 1940s
16PL47	12,	Ineligible	19th Century salt works for the Confederate Army	Gagliano and Castille 1981
16PL29	07, 08, 11, 12, 15	Undetermined	Fort Bourbon, Late 1700s	NA
16PL27	01,	Listed	Fort de la Boulaye, First fort on Mississippi 1700s	M. Ries 1936
16PL12	01,	Undetermined	St Thomas Cemetery 1845 - 20th century	Kniffen 1935
16PL13	07,	Eligible	Buras mounds, four earthen mounds prehistoric Plaquemine	Kniffen 1936, Coastal Environments 1979

* Recorders are those listed on site files on record at the LDA in Baton Rouge, Louisiana.

5.145 In Table 5-12, the number of previously recorded archaeological sites located within 1 mile of each NOV levee section are discussed, along with the number of these sites that are located within the APE and the description of those sites. In levee sections NOV 13 through 16, there are no previously recorded sites located within the APE.

Table 5-12. Previously Recorded Archaeological Sites within the APE

NOV Levee Section	Number of Sites Located Within 1 mile of NOV Levee Section	Number of Sites within APE	Description of Sites Within APE
NOV 01	26	1	The possible remains of Sophie Plantation (16PL104) is reported to be located within the proposed expanded ROW of NOV 01. The site is reportedly located off the embankment of the upriver portion of the NOV 01 levee with most of the plantation remains presumed to be under the levee itself. Heavy disturbance and minimal remains are cited as justification for the site's ineligibility recommendation (Goodwin et al. 1986). The site was not detected during the field survey portion of the current investigation and may have been entirely covered or removed in levee construction subsequent to its recording.
NOV 02	6	4	The four sites were recommended ineligible for the NRHP and would require no further consideration.
NOV 05	3	0	N/A
NOV 06	5	5	Four of the archaeological sites 16PL151, 16PL152, 16PL131, and 16PL64 have been recommended ineligible for the NRHP and no further consideration is necessary. Site 16PL132 (Old St. Patrick's Cemetery) had been relocated behind St. Patrick's Church in 1951 in advance of a levee construction project. The site was recorded on a Louisiana State Site Survey Form by T. Emerson in 1984 who recommended further testing of the site. The site was abandoned in 1952 following levee setback construction. In 1985, what remained of 16PL132 was a low mound with a small portion of an aboveground tomb wall, a tomb roof fragment, surface scatter of bricks, slate, and cement (Goodwin et al. 1985). Until the Goodwin et al. 1985 study, the eligibility of 16PL132 was undetermined. The Goodwin et al. 1985 investigation found that the site did not possess contextual integrity and was determined ineligible for the NRHP.

Table 5-12, continued

NOV Levee Section	Number of Sites Located Within 1 mile of NOV Levee Section	Number of Sites within APE	Description of Sites Within APE
NOV 07	8	1	Site 16PL29 is the presumed location of Fort Bourbon. The location of the fort was determined through archival cartographic reconstruction. Two survey reports (Chase et al. 1987; Hunter and Reeves 1988) are mentioned on the site record form, but neither investigation physically attempted to relocate the fort. According to the archives accessed in the survey reports, there were two episodes of construction at Fort Bourbon. The first occurred in 1794 and was promptly destroyed by a hurricane the following year with most of what constituted the fort being taken by the river. The second fort was built in 1796 and was occupied until approximately 1803. Fort Bourbon was built by the Spanish to crossfire with St. Philip across the river to stop enemy ships from ascending the river. The fort consisted of a small battery of guns and housing for the local militia. The Mississippi River has migrated in a southerly direction since its 18th and 19th century construction and is believed to have consumed the fort's location (Greene 1982; Hunter 1992). Attempts to relocate remains of the fort have been unsuccessful and no further work in the vicinity of the site location was recommended by an investigation in 1992 (Hunter 1992). Site 16PL38, also known as Fort Jackson, was nominated and listed as a National Historic Landmark in 1959. The bastioned brick pentagon of the fort remains along the West Bank of the river at Plaquemines Bend, 2 miles downriver from Triumph, Louisiana. The fort is located 0.9 mile north of the proposed corridor for NOV 07 and is obscured from view by the NOV 11 levee and trees.
NOV 08	4	0	N/A
NOV 09	5	1	Site 16PL139 is not considered eligible for the NRHP and no further consideration is necessary.
NOV 10	18	7	Six of these sites are considered ineligible for the NRHP and no further work is necessary. Site 16PL132 (Old Patrick's Cemetery) was discussed in the NOV 06 section and was determined to be ineligible for listing on the NRHP.

Table 5-12, continued

NOV Levee Section	Number of Sites Located Within 1 mile of NOV Levee Section	Number of Sites within APE	Description of Sites Within APE
NOV 11	13	2	Site 16PL29, also known as Fort Bourbon, described above in the NOV 07 discussion, is located within 1 mile of the Plaquemines Bend portion of the of the NOV 11 project corridor. The presumed location of the fort lies on the river side of NOV 11, which at the time of writing consists of a dredged canal and inundated batture swamp. In the 1992 investigation, the area encompassing the presumed location for 16PL29 was determined to require no further cultural resources work (Hunter 1992). As a result of the 1992 findings and the apparent fulfillment of proposed construction on the land including the site location impacts to 16PL29 would not be expected. Fort Jackson (16PL38) lies immediately adjacent on the river side of the NOV 11 ROW on Plaquemines Bend. Fort Jackson, was nominated and listed as a National Historic Landmark in 1959. Construction of the fort began in 1822 and it was used by the American military until 1920. The fort was part of a critical Civil War battle in 1862 when the Confederate army used the fortifications and those of Fort St. Philip across the river to try to stop the Union Navy's advance up the river to capture New Orleans. The fort was badly damaged from the Union bombardment and the Confederates were unsuccessful in stopping the advance. The bastioned brick pentagon of the fort remains along the West Bank of the river at Plaquemines Bend, 2 miles downriver from Triumph, Louisiana. Fort Jackson has been the subject of extensive survey (Hunter 1992; Hunter and Reeves 1990a, 1990b; USACE 1989). The expanded ROW required along NOV 11 for Alternative 2 that passes through the southeastern boundary of the Fort Jackson National Landmark has been subject to intensive survey that found no significant historic resources related to the fort (Hunter 1992). Additionally, a 1989 assessment of aesthetic impacts on Fort Jackson for previous levee construction that includes the downriver portion of NOV 11, determined that the increase in levee height and cross-section would be barely detectable from the fort, and would not present a significant viewshed issue (USACE 1989).
NOV 12	12	2	Fort Jackson (16PL38), described previously in the NOV 07 and NOV 11 existing conditions discussion, is located immediately west of approximately 1,640 ft of the upriver terminus of the proposed NOV 12 ROW. Most of this 1,640 ft consists of a freshwater reservoir, although direct and visual impacts would need to be considered for increasing the levee height and expanding the ROW in the direction of the fort. The potential wreck site for the C.S.S. Manassas (16PL92), described previously in the NOV 08 discussion, is located offshore from Boothville, Louisiana, in the river channel. The site requires further testing to confirm that it is the C.S.S. Manassas wreckage site and determine its eligibility. The Proposed Action does not extend into the river channel and would not affect the wreckage site.

5.146 The natural and built environment provided a variable landscape in which to conduct pedestrian and shovel testing transects. The number of transects and spacing of shovel tests varied based on the landscape conditions encountered in the field. Generally, transects running parallel with the levees spaced approximately 100 ft apart with shovel tests spaced every 100 ft were conducted within the ROW on dry ground except in areas that had been previously surveyed, appeared heavily disturbed, contained standing water, marsh, or swamp, or were covered in aggregate, asphalt, concrete, or buildings.

5.147 A challenge encountered during field survey included the very common occurrence of debris scattered across the landscape. The entire project area is centered on the location of Hurricane Katrina's landfall. The area suffered severe storm damage from the intense winds of Katrina's eyewall and flooding caused by storm surge and waves which topped 15 to 19 ft across the project area (Kieper 2006; Knabb et al. 2005). Floodwaters remained trapped within the rings of levees encompassing the project area for weeks following the storm (Kieper 2006). Across the project area, the wreckage of homes and buildings is strewn about the landscape with many debris piles and scattered cultural effects lying where the storm left them in vegetated areas and unmaintained properties. According to local reports and field observation, a common method for debris removal after the storm included mechanically pushing storm wreckage into piles and burning it in place or carrying it away in trucks. As a result, the surface and upper strata of soil across the study area has a high potential for disturbance and containing cultural material settling in floodwater sediment and from mechanical movement of upper strata.

5.148 Cultural material in these storm-affected strata may include modern and historic artifacts once kept as household items in homes and buildings destroyed by the storm, as well as any modern and historic artifacts that may have been in situ prior to the storm. This condition was noted in a high number of positive shovel tests, particularly in the vicinity of once-populated areas. Hurricane Katrina was one of several hurricanes and severe storms in recorded history to have caused extensive destruction in Plaquemines Parish. Additionally, the area has been under intensive agricultural use for nearly 300 years, contributing to the disturbed nature of the landscape. Determining those artifacts with depositional integrity from those re-deposited as a result of the storm and other landscape modifications was a challenge to this investigation. Modern debris including plastics, foils, and aluminum cans were commonly found in shovel tests 11.81 inches below surface to 15.75 inches below surface and in many cases with artifacts of potential historic age.

5.149 During field investigations, a total of 43 previously unreported archaeological sites and 94 isolated occurrences (IO) were recorded (Table 5-13). Among the 43 archaeological sites, 28 are recommended ineligible, 13 are of undetermined eligibility, and 2 are recommended eligible for the NRHP pending SHPO concurrence. The following discussion of field results are organized according to the separate levee sections surveyed. Given the sensitive nature of archaeological and historic site locations, maps and photographs of sites are not presented here. The results of surveys are only summarized below.

Table 5-13. Archaeological Sites Discovered in Current Investigations

Louisiana Site Trinomial	Site Field Designation	Temporal Association	Eligibility Recommendation
NOV 09			
16PL239	NOV 9-1	Historic/Modern	Ineligible
16PL240	NOV 9-2	Historic/Modern	Ineligible
16PL241	NOV 9-3	Historic/Modern	Ineligible
16PL242	NOV 9-4	Historic/Modern	Ineligible
16PL243	NOV 9-5	Historic/Modern	Ineligible
16PL244	NOV 9-6	Historic/Modern	Ineligible
16PL245	NOV 9-8	Historic/Modern	Undetermined, Further Testing
16PL246	NOV 9-9	Historic/Modern	Ineligible
16PL247	NOV 9-10	Historic/Modern	Ineligible
16PL248	NOV 9-11	Historic/Modern	Undetermined, Further Testing
16PL231 Locus 1	NOV 9-12	Historic/Modern	Potentially eligible
NOV 10			
16PL207	NOV 10-2	Historic/Modern	Ineligible
16PL208	NOV 10-3	Historic/Modern	Undetermined, Further Testing (Pending Lab analysis)
16PL209	NOV 10-4	Historic/Modern	Ineligible
16PL210	NOV 10-5	Historic/Modern	Undetermined, Further Testing
16PL211	NOV 10-6	Historic/Modern	Undetermined, Further Testing
16PL213	NOV 10-7	Historic/Modern	Ineligible
16PL212	NOV 10-8	Historic/Modern	Undetermined, Further Testing
16PL214	NOV 10-10	Historic/Modern	Undetermined, Further Testing
16PL215	NOV 10-11	Historic/Modern	Undetermined, Further Testing
16PL216	NOV 10-12 /NOV 10-13 combined	Historic/Modern	Undetermined, Further Testing
16PL217	NOV 10-14	Historic/Modern	Eligible
16PL218	NOV 10-15	Historic/Modern	Ineligible
16PL219	NOV 10-16	Historic/Modern	Undetermined, Further Testing
16PL220	NOV 10-17	Historic/Modern	Undetermined, Further Testing

Table 5-13, continued

Louisiana Site Trinomial	Site Field Designation	Temporal Association	Eligibility Recommendation
16PL221	NOV 10-18	Historic/Modern	Ineligible
16PL222	NOV 10-19	Historic/Modern	Ineligible
16PL223	NOV 10-20	Historic/Modern	Ineligible
16PL224	NOV 10-21	Historic/Modern	Ineligible
16PL225	NOV 10-22	Historic/Modern	Ineligible
16PL226	NOV 10-23	Historic/Modern	Ineligible
16PL227	NOV 10-24/25	Historic/Modern	Ineligible
16PL228	NOV 10-26	Historic/Modern	Ineligible
16PL229	NOV 10-27	Historic/Modern	Ineligible
16PL230	NOV 10-28	Historic/Modern	Undetermined, Further Testing
16PL231 Locus 2	NOV 10-29	Historic/Modern	Eligible
16PL232	NOV 10-30	Historic/Modern	Ineligible
NOV 11			
16PL236	NOV 11-1	Historic/Modern	Ineligible (Pending Lab analysis)
16PL237	NOV 11-2	Historic/Modern	Ineligible (Pending Lab analysis)
16PL238	NOV 11-3	Historic/Modern	Unknown, Further Testing (Pending Lab analysis)
NOV 15			
16PL206	NOV 10-1	Historic/Modern	Unknown, Further Testing (Pending Lab analysis)
NOV 16			
16PL233	NOV 16-1	Historic/Modern	Ineligible
16PL231 Locus 3	NOV 16-2	Historic/Modern	Eligible
16PL234	NOV 16-3	Historic/Modern	Ineligible
16PL235	NOV 16-4	Historic/Modern	Ineligible

NOV 01

5.150 Along the 15.8-mile expanse of NOV 01, 10 positive shovel tests were encountered within a 200-ft-wide survey corridor on either side of the levee. Further shovel testing in association with these ten positive shovel tests resulted in no additional historic or archaeological sites and 10 IOs recorded. No significant historic or archaeological resources were encountered along NOV 01 during this investigation.

NOV 02

5.151 Survey of NOV 02 was incorporated into the survey transect corridors investigated along NOV 01. No positive shovel tests were encountered in association with NOV 02 survey. No additional historic or archaeological resources were encountered in association with the survey of NOV 02 during this investigation.

NOV 05

5.152 Shovel test results along the St. Jude Road portion of NOV 05 included two positive shovel tests. Further shovel testing in association with the two positive shovel tests did not recover additional associated cultural deposits, resulting in these shovel tests being considered IOs. No additional historic or archaeological resources were encountered in association with the 200-ft-wide survey corridor on either side of NOV 05.

NOV 06

5.153 No positive shovel tests or surface finds were encountered in surveys along this section, although one abandoned potentially historic steel girder bridge in disrepair and exhibiting modern pilings was encountered crossing the canal from the Plaquemines Parish Waste Management Facility. The modern pilings suggest that the bridge had been moved or had the original pilings replaced, compromising the historic integrity of the bridge's context.

NOV 07

5.154 No positive shovel tests, surface finds or historic standing structures were encountered in the 200-ft-wide survey corridor on either side of this section.

NOV 08

5.155 Two positive shovel tests were encountered along the survey of NOV 08. Further shovel testing resulted in no additional associated cultural deposits. The two original positive shovel tests have been determined to be IOs and non-significant.

NOV 09

5.156 Transect survey along NOV 09 resulted in the delineation of 11 archaeological sites. The relatively high occurrence of positive shovel tests along the survey of NOV 09 is likely influenced by the storm-induced scattering of cultural material across the area. According to reports from the residents and field observation, the area suffered extensive destruction from Hurricane Katrina with the wreckage or vestiges of homes and buildings apparent across the survey area. Piled up debris was commonly encountered in unmaintained vegetated areas.

Site 16PL239 (NOV 9-1)

5.157 Site 16PL239 is located in a cleared agricultural field partially tilled and partially fallow at the time of recording. Site 16PL239 represents an extensive surface and subsurface scatter of potentially historic and modern artifacts. Artifacts were recovered from a maximum depth of 50 cmbs and do not extend below the plow zone. Despite artifacts with production date ranges extending from the late 19th to early 20th century, no clear historic depositional sequence could be discerned from the plow zone disturbance, and the site has low integrity. As a result, Site 16PL239 is recommended ineligible for the NRHP and no further work is required.

Site 16PL240 (NOV 9-2)

5.158 Site 16PL240 was encountered in the backyard of a residential property located between the MRL to the northeast and Diamond Road to the southwest. The landscape across the site consists of a mowed grass field exhibiting evidence for previous agricultural plowing. Two mobile homes occupy the property beyond the survey ROW.

5.159 Site NOV 16PL240 is representative of a scatter of potentially historic and modern artifacts with no clear depositional sequence. Previous plowing of the property likely disturbed any depositional integrity that may have existed. As a result, Site NOV 9-2 is recommended ineligible for NRHP and no further work is recommended.

Site 16PL241 (NOV 9-3)

5.160 Site 16PL241 was discovered on an unoccupied property located between the MRL to the northeast and Diamond Road beyond the survey ROW to the southwest. It remains unclear whether the property's most recent use has been residential or agricultural. The landscape across the site varies west to east from a cleared mowed grass easement for a drainage ditch, to overgrown grass, briars and weeds, to established hardwood trees.

5.161 Site 16PL241 is a scatter of potentially historic and modern artifacts. Across the site, modern artifacts were found to be mixed with those of potentially historic age with no clear historic depositional sequence established. As a result, Site 16PL241 possesses low integrity and limited research potential and is recommended ineligible for the NRHP, and no further work is necessary.

Site 16PL242 (NOV 9-4)

5.162 Site 16PL242 was discovered on an unoccupied residential property with overgrown ground cover. The property is located between the MRL to the northeast and Diamond Road beyond the survey ROW to the south. Evidence for NOV 9-4 was found around a concrete slab near the boundary of the survey ROW.

5.163 Site 16PL242 was found to contain historic and modern artifacts. Artifact-bearing deposits observed in shovel tests across the site were mostly shallow and appearing disturbed with mixing of modern or non-descript materials. As a result, Site 16PL242 possesses low integrity and limited research potential and is recommended ineligible for the NRHP. No further work is necessary at Site 16PL242.

Site 16PL243 (NOV 9-5)

5.164 Site 16PL243 was encountered on an unoccupied residential lot between the MRL to the north and Diamond Road to the south. The remnants of a chain wall foundation suggests that a home was once located on the property. At the time of recording the site was covered in overgrown grass and weeds.

5.165 Site 16PL243 is a minimal scatter of potentially historic and modern artifacts, likely debris from the demolished house. Despite possessing artifacts with production date ranges that extend back to the historic period, no distinctive historic deposit was observed in subsurface

tests. As a result, Site 16PL243 has a low research potential and is recommended ineligible for the NRHP.

Site 16PL244 (NOV 9-6/7)

5.166 Site 16PL244 was encountered in shovel tests along Diamond Road across (south) from the MRL in Diamond, Louisiana. Diamond Road abuts and runs parallel with the toe of the levee through this part of town. Site 16PL244 extends across the maintained front lawns of four residential properties occupied by mobile homes, some of which are situated on or beside the concrete slab or foundation remains of homes destroyed by Hurricane Katrina. 16PL244 was initially delineated as two separate sites NOV 9-6 and NOV 9-7 and later combined as 16PL244 when it was determined that the sites were close enough and bore similar artifact assemblages to likely have a similar origin.

5.167 Site 16PL244 represents a scatter of historic and modern artifacts across a densely settled residential area, recently suffering from a severe hurricane-induced disaster. Deposits across the site appear disturbed with no discernable intact historic deposit observed in subsurface testing. As a result, Site 16PL244 is recommended ineligible for the NRHP and no further work is recommended.

Site 16PL245 (NOV 9-8)

5.168 Site 16PL245 was discovered in a densely settled residential area between the MRL and Diamond Road beyond the survey ROW in Diamond, Louisiana. Site 16PL245 is situated in the maintained backyard lawns of residential lots occupied by mobile homes, which are situated on or beside the concrete slabs and foundation remains of homes demolished during Hurricane Katrina.

5.169 Despite some evidence for disturbance, Site 16PL245 contains potentially intact deposits dating from the mid-19th century to the present. The artifact assemblage contains domestic wares as well as architectural debris suggesting that the site represents past settlement of the area. Further research is recommended to determine if Site 16PL245 can provide further information pertaining to the life ways of people living in the historic town of Diamond, Louisiana during the mid-19th to early 20th century. As a result, the NRHP eligibility recommendation for Site 16PL245 is undetermined.

Site 16PL246 (NOV 9-9)

5.170 Site 16PL246 is located in the backyard of two occupied residential properties between the MRL to the north and Diamond Road to the south, beyond the survey ROW. The landscape across the site consists of maintained lawns and shade trees.

5.171 Site 16PL246 is a mixed scatter of historic and modern artifacts. No discernable intact historic deposit was interpreted in the provenience record, and as a result Site 16PL246 is recommended ineligible for the NRHP. No further work is recommended.

Site 16PL247 (NOV 9-10)

5.172 Site 16PL247 was discovered in the unmaintained overgrown backyard of a residential property with frontage on Diamond Road to the south and the MRL to the north in Diamond,

Louisiana. The landscape across the site included hardwood trees with dense undergrowth and ground cover.

5.173 Site 16PL247 consists of a discrete scatter of potentially historic and modern artifacts recovered from two shovel tests. The artifacts recovered from deposits in both shovel tests are similar to one of the shovel tests appearing to have integrity. Despite the potential intact nature of historic deposits in one of the shovel tests excavated at Site 16PL247, the information potential is limited for the area. As a result, Site 16PL247 is recommended ineligible for the NRHP, and no further work is required.

Site 16PL248 (NOV 9-11)

5.174 Site 16PL248 was encountered in a wooded area between the MRL to the north and Diamond Road beyond the survey ROW to the south in Diamond, Louisiana. The site location is in the overgrown backyard of an occupied residential property with a mobile home fronting Diamond Road beyond the extent of the survey ROW to the south.

5.175 Site 16PL248 is representative of a scatter of modern and historic artifacts consistent with domestic utilitarian and architectural usage in the late nineteenth century through the present. The deposits encountered in shovel tests possess depositional integrity. Despite the historic age and integrity of the deposits, Site 16PL248 represents a minimal scatter with a limited artifact inventory and further research is not likely to yield significant additional information about the past. As a result, Site 16PL248 is recommended ineligible for the NRHP.

Site 16PL231 Locus 1 (NOV 9-12)

5.176 Site NOV 9-12 is located on an occupied parcel of land between the MRL to the north and Diamond Road to the south in Diamond, Louisiana. The landscape across the site is covered with overgrown ground cover and brush. A prominent raised linear feature on a 120 degree bearing crosses from the boundary of the survey ROW to the northwest, decreasing in raised prominence in a low wet area toward the MRL to the southeast. This raised linear feature is the defining characteristic of the site, consistent with the New Orleans to Fort Jackson and Grand Isle Railroad line built in 1892 that passed through this location. Shovel testing in the vicinity of the feature revealed limited artifacts, but contained a great quantity of the shell aggregate used to build up the railroad embankment. One railroad spike and a brace for a railroad spike were recovered from a shovel test providing further confirmation for the railroad embankment interpretation.

5.177 Site 16PL231 Locus 1 is the remains of a section of the New Orleans to Fort Jackson and Grande Isle Railroad built in 1889 (Howe and Price 2011; Union Pacific 2011). This suspicion was further confirmed by comparison of field data to 1893 Mississippi River Commission (MRC) Charts 80 and 81 (MRC 1893a and 1893b) depicting the railroad corresponding with the same location of the abandoned rail bed feature. The rail bed feature retains integrity and can be associated with events that have made a significant contribution to the broad patterns of our history (36 CFR 60.4 Criterion A), particularly the historic use of railroads and their importance to the socioeconomics of the late nineteenth to early twentieth century in Plaquemines Parish. As a result, Site 16PL231 is recommended eligible for the NRHP. A portion of the railroad remains in use upriver, from Algiers to the Conoco Phillips Alliance Refinery, in Belle Chasse,

Louisiana. Downriver from the refinery, the railroad has been dismantled with only vestiges such as Site 16PL231 remaining. In the event that other sections of the historic railroad are encountered, it is recommended that these should be recorded as additional loci of an all-encompassing railroad site. Two additional loci of Site 16PL231 have been encountered in the survey ROW of the current investigation along NOV 10 and NOV 16 are described below.

NOV 10

5.178 A total of 26 sites were discovered during survey transects of NOV 10. NOV 10 extends through densely populated areas including the towns of Port Sulphur and Homeplace with numerous residential, business, and industrial properties along the survey ROW. According to reports from the residents and field observation, the area suffered extensive destruction from Hurricane Katrina with the wreckage or vestiges of homes and buildings apparent across the survey area. The relatively high occurrence of positive shovel tests along the survey of NOV 10, particularly in the vicinity of populated areas, is likely influenced by the storm-induced scattering of cultural effects across the area. Piled up debris was commonly encountered in unmaintained vegetated areas.

Site 16PL207 (NOV 10-2)

5.179 Site 16PL207 was encountered on a cleared residential lot in Happy Jack, Louisiana. A layer of sandy fill overburden approximately 10 inches below surface to 15 inches below surface in depth was encountered in shovel tests across the site, occasionally accompanied by Rangia shell and gravel fill. A neighboring resident reported that the area had been extensively damaged by Hurricane Katrina with many nearby homes demolished and that sand had been imported to build up properties in the vicinity following the storm. Artifacts were recovered from within and below the fill deposits.

5.180 The collection of artifacts recovered has production dates ranging from the late 18th century through the present. The context from where the artifacts were recovered appears disturbed, consisting of imported fill and a disturbance of deposits at the fill subsurface interface. Given this situation, it is questionable whether the artifacts originated from the imported fill or mixed from the deposits below the fill layer. Overall, the site is lacking depositional integrity and, as a result, recommended ineligible for the NRHP.

Site 16PL208 (NOV 10-3)

5.181 Site 16PL208 was discovered approximately 131 ft downriver from Site NOV 10-2 in Happy Jack, Louisiana. Site 16PL208 covers an extensive area. The southeastern boundary of the site was determined through shovel test delineation. Any continuation of the site to the northwest and northeast would have been destroyed or covered in road and levee construction. Site delineation was discontinued at the boundary of the survey ROW due to constraints of the rights of entry. The landscape across the site consists of cleared residential properties with maintained lawns, a garden and an agriculture field currently fallow with uncut vegetation. Artifacts were generally recovered in the upper 12 inches below surface of deposits, although occasional shovel tests were also positive between 12 to 31 inches below surface.

5.182 Site 16PL208 is a large site that appears to have the attributes of a mid-19th century to modern scatter, with some deep deposits. Some deposits appear to be intact, and could possibly

yield information about the late historic occupation of Plaquemines Parish, Louisiana. The area of the site beyond the ROW has not been tested to determine whether NOV 10-3 extends beyond this point. Further research is required to determine the nature of the late historic presence at the site and isolate what portions of the site retain integrity and potential eligibility. As a result, the eligibility recommendation for the site remains undetermined.

Site 16PL209 (NOV 10-4)

5.183 Site 16PL209 is located in a maintained lawn beside an aluminum building. The property on which the site is situated is bounded by Port Sulphur River Road to the south-southwest and the MRL to the northeast in Happy Jack, Louisiana. Site 16PL209 is constrained by the MRL on the east and the aluminum building on the west. The northern and southern site boundaries were determined through shovel test delineation.

5.184 Site 16PL209 consists of a debris scatter with late historic to modern artifacts. The mixture of modern plastics and aluminum can fragments with artifacts of potential historic age suggests that the deposits have been disturbed. Considering the lack of integrity of deposits and limited information potential of artifacts recovered, Site 16PL209 is recommended ineligible for the NRHP.

Site 16PL210 (NOV 10-5)

5.185 Site 16PL210 was discovered across Port Sulphur River Road from the MRL near the back entrance to Fremin's Food Market in Port Sulphur, Louisiana. Along the portion of the survey ROW where the site was encountered, Port Sulphur River Road runs parallel and abuts the MRL. The road and the MRL define the northeastern boundary of the site, and a portion of the southeastern boundary of the site is uncertain, as shovel testing was discontinued beyond the extent of the survey ROW due to right of entry concerns. The northwestern and southeastern boundaries were delineated through shovel testing. The landscape across the site consists of a small wooded section and maintained lawn.

5.186 Artifacts at Site 16PL210 appear to date between the mid-19th century and the early 20th century, with some modern debris mixed in, mostly in the shallow layers. 16PL210 appears to have integrity in most of its deposits, and with three features located within the site, further work is necessary to determine the eligibility of the site for the NRHP.

Site 16PL211 (NOV 10-6)

5.187 Site 16PL211 is situated on an unoccupied residential property with what appear to be salvaged architectural materials, mechanical equipment, tools, home furnishings, and household items. The property lies opposite of the MRL along Port Sulphur River Road. A shell driveway and a second asphalt driveway are located on the property. What appears to be the former location of a house and two existing sheds lies beyond the survey ROW for the current project. Amidst the salvaged effects, overgrown grass covers the property along with two oak trees and overgrown pioneer vegetation. Artifacts were recovered in six shovel tests.

5.188 One feature was recorded at the site. The feature consisted of an elongated chimney-like brick masonry object lying lengthwise on the ground surface. The feature does not appear to be a chimney or pier that has fallen *in situ*, as no evidence of an associated hearth or building is

present. The unbroken condition of the feature does not seem consistent with a brick masonry feature that would have fallen, but may have been carefully taken down and moved to its current location. Judging from the sundry of other salvaged items and materials on the property it seems likely that this feature is representative of another such salvage event.

5.189 The extent of Site 16PL211 that was delineated in the current investigation consists of a debris scatter with late historic to modern artifacts. It appears that the scatter is related to the former house that once occupied the property beyond the survey ROW prior to Hurricane Katrina. Overall, the site is representative of a former late historic to modern residential property now unoccupied and used to store salvage. Given that the site likely extends beyond the survey ROW and has not been surveyed in its entirety, it is not possible to make a recommendation regarding the site's eligibility, and as a result, the eligibility of Site 16PL211 remains unknown, requiring further analysis.

5.190 However, for the portion of the site delineated within the survey ROW, artifacts were recovered from relatively shallow deposits (less than 12 inches below surface) and were predominantly a mixture of modern and late historic materials suggesting depositional disturbance. Feature 1 is of unknown age, is not *in situ*, and lacks integrity. The portion of Site 16PL211 surveyed within the survey ROW of this project would not be a contributing factor in an eligibility recommendation for the site.

Site 16PL213 (NOV 10-7)

5.191 Site 16PL213 was discovered in a maintained lawn on the east corner of Holiday Road and Port Sulphur River Road beside a concrete slab of a former house. The site lies within the survey ROW opposite Port Sulphur River Road from the MRL. Site delineation was discontinued to the north, west and east due to the pavement of Holiday Road and Port Sulphur River Road as well as the levee. The southern site boundary was determined through shovel test delineation. Any continuation of the site to the north and west would have been destroyed or covered during road and levee construction.

5.192 No cultural features were discovered at this site and cultural deposits are shallow. Artifacts are very low in density, and the variety is sparse and non-diagnostic. This site appears to be a late historic to modern scatter. Site 16PL213 is recommended ineligible for the NRHP. No further research is necessary.

Site 16PL212 (NOV 10-8)

5.193 Site 16PL212 is located across Port Sulphur River Road from the MRL in Port Sulphur, Louisiana. The site location consists of a maintained lawn that was the front yard of a residential property that is now unoccupied and without a housing structure. A gravel driveway extends into the property and beyond the survey ROW along the northwestern boundary of Site 16PL212, presumably toward the former location of a domicile. Site delineation was discontinued to the north and northeast of the site due to the presence of pavement on Port Sulphur River Road and the MRL and to the south due to the limits of the survey ROW. Any continuation of the site to the north and northeast would have been destroyed or covered in previous road and levee construction. To the south, the site boundary remains uncertain.

5.194 Site 16PL212 is representative of a late historic to modern artifact scatter. Given the uncertainty of how far the site extends beyond the limits of the survey ROW, it is not possible to make a recommendation of the overall eligibility of the site. For the portion of the site recorded in this investigation, the eligibility recommendation for the site remains unknown, requiring further research.

Site 16PL212 (NOV 10-10)

5.195 Site 16PL212 is situated along Port Sulphur River Road opposite the MRL. The majority of the site was delineated in the strip of mowed grass approximately 100 ft wide running parallel with the road. Beyond 100 ft from the road, the maintained grass gives way to trees and thick secondary growth for the remaining extent of the survey ROW. Site delineation along the northeastern boundary of the site was discontinued at the pavement of Port Sulphur River Road and the MRL. The extent of the survey ROW prevented further delineation of a portion of the southwestern site boundary due to rights of entry constraints. The northwest and southeast boundaries were delineated through shovel testing. A partially overgrown gravel road or driveway extends perpendicular from Port Sulphur River Road toward the woods in the northern part of the site.

5.196 Site 16PL212 represents a late historic to modern artifact scatter. Deposits appear to be intact. Further research is required to determine the nature of the late historic presence at the site and as a result, the eligibility recommendation for the site remains unknown, requiring further research.

Site 16PL215 (NOV 10-11)

5.197 Site 16PL215 was discovered at a slight southerly bend in Port Sulphur River Road that corresponds to a similar bend in the MRL. The site area extends across a mowed strip of grass along the west side of Port Sulphur River Road and into thick vegetation consisting of trees and undergrowth for the remainder of the survey ROW. The northern and southern boundaries of the site were delineated through shovel testing. To the east of the site, shovel testing was discontinued at the road and MRL, and on the west side of the site, shovel testing ceased at the extent of the survey ROW for rights of entry constraints.

5.198 Site 16PL215 represents a late historic to modern artifact scatter with primarily intact deposits. Artifacts suggest a mid-19th century to present cultural presence. The artifact assemblage contains domestic wares as well as architectural debris, suggesting that the site represents past settlement of the area. Further research is required to determine the nature of the late historic presence at the site, and, as a result, the eligibility recommendation for the site remains undetermined requiring further research.

Site 16PL216 (NOV 10-12/13)

5.199 Site 16PL216 was discovered in a pecan grove across Port Sulphur River Road from the MRL in Port Sulphur, Louisiana. Site delineation was constrained by the easement of Port Sulphur River Road and MRL to the northeast and the extent of the survey ROW on the southwest. Site boundaries were determined through shovel testing to the northwest and southeast of the site. The landscape across the site consisted of regularly spaced 25-ft-wide mounded rows extending perpendicularly from Port Sulphur River Road. The rows are covered

in grass with several pecan trees. According to the landowner, the rows once supported citrus trees, and an old house (age not specified) once occupied a clear area between trees near the center of the site. It would seem that the old house had been removed prior to the citrus grove land use, as the mounded rows passed through the former house location specified by the landowner. More recent residential occupation is evident in the mobile home and Quonset shed located to the northwest of the site and the concrete house pad and mobile homes to the southeast of the site. Initially, a cessation in artifact recovery from shovel tests in the vicinity of the northwest edge of the pecan grove was interpreted as the southeast boundary for Site NOV10-12 (field designation number); however, this boundary was found to be within 33 ft of the northwest boundary of Site NOV10-13 (field designation number), and it is more likely that the artifact scatter is representative of a single site with concentration areas. Sites NOV 10-12 and NOV 10-13 are combined as 16PL216.

5.200 Site 16PL216 represents a late historic to modern artifact scatter with primarily intact deposits. Artifacts suggest a mid-19th century to present cultural presence. The artifact assemblage contains domestic wares as well as architectural debris, suggesting that the site represents past settlement of the area. Further research is required to determine the nature of the late historic presence at the site, and, as a result, the eligibility recommendation for the site remains undetermined requiring further research.

Site 16PL217 (NOV 10-14)

5.201 Site 16PL217 was discovered on the opposite (southwest) side of Port Sulphur River Road from the MRL. The site setting consists of a stand of hardwood trees and thick undergrowth 33 to 100 ft wide running parallel with Port Sulphur River Road and giving way to an open field of mowed grass to the southwest. A mobile and house occupied by the property resident as well as a storage/workshop building are present in a cluster beginning approximately 82 ft to the southeast of the site. Site 16PL217 consists of a dense surface scatter of historic and modern artifacts around the remains of a pier and beam building (Feature 1), as well as subsurface artifacts recovered in shovel tests surrounding the ruins. Feature 1 includes 12 laid-brick building piers in various stages of collapse, aligned in a 25-ft by 20-ft rectangle with long axis at a magnetic 40-degree bearing. Additional architectural debris includes a collapsed brick chimney and hearth, piles of asbestos siding, corrugated metal roofing, cast iron, galvanized metal and Polyvinyl Chloride (PVC) piping, concrete steps, a brick walkway along the southern end of the ruins, and a collapsed cinderblock structure on top of a 5-ft by 6-ft concrete slab adjacent to the southeast corner of the ruins. A scatter of domestic fixtures, implements and containers were observed among the ruins including a sink, refrigerator door, stove parts, a pump flywheel, metal pots, a colander, glass bottles, jars, and jugs, ceramics, and wiring. A study grid was imposed over the ruins and surface scatter, and a 25% sample collection of artifacts was taken from randomly selected 6-ft by 6-ft sample squares. Noticeably absent from the remains of the pier and beam building was the wood that would have formed the structure. With no sign of fire, presumably, this material had been removed and salvaged.

5.202 During field survey of 16PL217, the property owner visited with the crew and reported that the building ruins are all that remains of a larger plantation complex of buildings that are now under the existing levee and Port Sulphur River Road. He indicated that he personally dismantled the main house in the 1970s when the levee expansion resulting in the current

footprint was built. He described the plantation complex as being his grandfather's and resembling the Woodlawn Plantation upriver near West Pointe a la Hache, LA. He did not know exactly when the plantation had been built, but knew it went back well into the 1800s at least. He further described the ruins being recorded as that of a kitchen house, kept separate from the main house on account of keeping the main house cool. He said that the kitchen house remained in a deteriorating state after levee construction in the 1970s and during the construction of Port Sulphur River Road until Hurricane Katrina finished it off. He also mentioned once having photographs, drawings and paperwork pertaining to the plantation, but all of it was swept away in Hurricane Katrina.

5.203 Site 16PL217 is representative of a historic period building location and artifact scatter. Several building piers remain intact, and overall site integrity is good. As the only surviving remains of a historic plantation building complex, the site retains potential to provide significant information regarding the historic land use and cultural activity along this portion of Port Sulphur associated with broad patterns in history such as large land holdings in antebellum and post-antebellum Plaquemines Parish. As a result, Site 16PL217 is recommended eligible for the NRHP under Criterion A.

Site 16PL218 (NOV 10-15)

5.204 Site 16PL218 was discovered in a residential yard with a maintained lawn sparsely populated with shade trees in Port Sulphur, Louisiana. The MRL abuts Port Sulphur River Road opposite from (northeast) Site 16PL216. An occupied mobile home is present on the property to the east of the site.

5.205 Site 16PL218 is representative of a late historic to modern artifact scatter of questionable integrity. The artifact collection includes items of historic age of a domestic nature, though not in a density to suggest long-term occupation or other definable cultural activity. For the area and time period suggested by the artifacts recovered, the research potential for the site is limited, and as a result, 16PL218 is recommended ineligible for the NRHP, with no further work required.

Site 16PL219 (NOV 10-16)

5.206 Site 16PL219 was encountered in shovel tests along Port Sulphur River Road in Port Sulphur, Louisiana. The property where the site was recorded includes a maintained lawn, sparse shade trees, a circular pattern of overgrown weeds surrounding a tree stump, a concrete walkway and foundation slab, and an unoccupied camper.

5.207 Site 16PL219 consists of a discrete scatter of historic and modern artifacts, with a diverse presence of late eighteenth century to nineteenth century ceramics. The artifacts recovered from the upper 7.87 inches below surface are mixed with modern materials. Deposits 7.87 to 27.56 inches below surface appear to have integrity. Further research is required to determine the nature of the late historic presence at the site, and as a result the eligibility recommendation for the site remains undetermined.

Site 16PL220 (NOV 10-17)

5.208 Site 16PL220 was found in a partially abandoned residential lot with low overgrown undergrowth vegetation and the neighboring occupied residential lot with a maintained lawn

across (west) from the MRL. The site consists of artifacts recovered in subsurface deposits in 14 shovel tests.

5.209 Site 16PL220 represents a late historic to modern presence. Deposits appear to be intact. Further research is required to determine the nature of the late historic presence at the site, and as a result, the eligibility recommendation for the site remains undetermined.

Site 16PL221 (NOV 10-18)

5.210 Site 16PL221 was discovered approximately 100 ft southeast from 16PL220, partially situating the site on the same residential property and that of the neighboring lot to the southeast. The site area is partially covered in maintained lawn and woods. Site 16PL221 consists of an artifact scatter recovered in eight shovel tests.

5.211 The shovel tests with artifacts of the most historic potential and recovered from the greatest depth (31 to 35 inches below surface) are located along the edge of the Port Sulphur River Road easement composed of a slight embankment. One of these shovel tests is within 3.3 ft of a utility pole. The deposits in these shovel tests appear to have been disturbed despite the historic nature of their contents. Shovel tests elsewhere across the site and away from the road easement also contain potentially historic artifacts, but in more shallow deposits (8 to 16 inches below surface). Given the present body of data collected, Site 16PL221 is representative of a late historic to modern presence. Artifacts were recovered from shovel tests of variable integrity, suggesting that the site is at least partially disturbed from road and utility construction. For the area, the artifact scatter comprising Site 16PL221, however potentially historic, contains low research potential and, as a result, is recommended ineligible for the NRHP.

Site 16PL222 (NOV 10-19)

5.212 Site 16PL222 is an intermittent scatter of artifacts extending for 330 ft along Port Sulphur River Road across from the MRL in Port Sulphur Louisiana. The landscape across the site varies from the maintained lawn of a residential mobile home complex to an unmaintained structureless residential lot overgrown with trees and undergrowth with push piles of soil and debris, to another structureless unoccupied residential lot with a maintained lawn.

5.213 Site 16PL222 is representative of modern residential disturbance with some artifacts, suggesting a late historic presence. Deposits across a majority of the site include modern material such as plastic mixed into the upper levels (16 inches below surface) of stratigraphy. The limited number of historic artifacts and evidence for disturbance across most of the site limits the information potential of 16PL222 and, as a result, is recommended ineligible for the NRHP, requiring no further work.

Site 16PL223 (NOV 10-20)

5.214 Site 16PL223 was discovered in three shovel tests located in the 33-ft strip of mowed grass between Port Sulphur River Road and a wooded area (southwest) across from the MRL. Delineation of the site was limited to the north and east by the pavement of Port Sulphur River Road and the MRL.

5.215 Site 16PL223 is representative of an artifact scatter with members ranging from the mid-nineteenth century to present mixed in disturbed deposits by the road easement for Port Sulphur River Road. Despite the potential historic age of some of the artifacts, they are not representative of an intact deposit and, as a result, 16PL223 is recommended ineligible for the NRHP and no further work is recommended.

Site 16PL224 (NOV 10-21)

5.216 Site 16PL224 was encountered in a maintained lawn beside (west of) Port Sulphur River Road across from the MRL. The property is presently occupied by a residential mobile home. Shovel test delineation detected the site in three shovel tests confined to within 33 ft of Port Sulphur River Road where shovel tests were discontinued north and east due to pavement and the MRL.

5.217 Site 16PL224 is representative of a mid-nineteenth to twentieth century artifact scatter. The pattern of shovel tests indicates that the site is limited to within 33 ft of Port Sulphur River Road, under which it may continue toward the levee. Although Site 16PL224 contains a historic artifact scatter with intact deposits, it is now covered by Port Sulphur River Road and the MRL, limiting the research potential for the site. As a result, Site 16PL224 is recommended ineligible for the NRHP and no further work is required.

Site16PL225 (NOV 10-22)

5.218 Site 16PL225 consists of a minimal artifact scatter detected in two shovel tests excavated southwest of Port Sulphur River Road across from the MRL in a maintained lawn of an unoccupied residential lot. Delineation of the site was impeded to the north and east by the pavement of Port Sulphur River Road and the MRL.

5.219 Site 16PL225 represents a minimal artifact scatter with a potential late historic to modern date range. With limited evidence and questionable integrity, the information potential provided by Site 16PL225 is scant. As a result, Site 16PL225 is recommended ineligible for the NRHP and requires no further work.

Site 16PL226 (NOV 10-23)

5.220 Site 16PL226 extends over three residential lots with maintained lawns, mobile homes and shell driveways. The site is located to the southwest of Port Sulphur River Road and across from the MRL. Site delineation was impeded to the north and east by the pavement of Port Sulphur River Road and to the south and west by the extent of the survey ROW.

5.221 Site 16PL226 represents an extended scatter of historic and modern artifacts. The historic artifacts recovered in the collection suggest a historic presence in the area, but mixing with modern artifacts and lack of a clear depositional sequence suggests that the site bears little to no integrity. As a result, Site 16PL226 is recommended ineligible for the NRHP, and no further work is necessary.

Site 16PL227 (NOV 10-24/25)

5.222 Site 16PL227 was discovered in a maintained lawn in the front yard of an occupied residential lot and an abandoned residential lot with overgrown grass along Port Sulphur River

Road across from the MRL in Port Sulphur, Louisiana. Beyond the ROW, the property appears to have ruins of a house that once occupied the property. A pond resulting from a borrow pit forms the northern border of the property. Site delineation was impeded by the pavement of Port Sulphur River Road and the MRL to the north and east. Evidence for Site 16PL227 is derived from seven positive shovel tests.

5.223 Site 16PL227 is representative of a minimal scatter of historic, potentially historic, and modern artifacts. Although several artifacts have production date ranges that span historic and modern years, no depositional sequence could be derived from the data recovered to suggest a definitive historic event or progression occurred at the site. Because of the minimal nature of the evidence at the site, and lack of a definitively dated historical event or sequence observed in deposits, Site 16PL227 is recommended ineligible for the NRHP and no further work is required.

Site 16PL228 (NOV 10-26)

5.224 Site 16PL228 was found on a residential property along Port Sulphur River Road, across from the MRL in Port Sulphur, Louisiana. The landscape across the property consists of a maintained lawn crossed by three shell driveways and interspersed with bushes and shade trees. Evidence for the site was recovered from four dispersed shovel tests.

5.225 Site 16PL228 represents a dispersed scatter of potentially historic to modern artifacts. Although production of some of the artifacts extends back to historic years, none of the artifacts could be definitively dated to the historic period. For the area, Site 16PL228 lacks significant information potential and, as a result, is recommended ineligible for the NRHP. No further work is required.

Site 16PL229 (NOV 10-27)

5.226 Site 16PL229 was discovered across two residential properties along Port Sulphur River Road across from the MRL in Port Sulphur, Louisiana. The residential properties are unoccupied and the landscape varies from low overgrown ground cover to woodland with dense secondary growth to maintained lawn.

5.227 Site 16PL229 represents a scatter of late historic to modern artifacts. Although several artifacts have production date ranges that span historic and modern years, no depositional sequence could be derived from the data recovered that would suggest that a definitive historic event or progression occurred at the site. Site 16PL229 possesses little integrity and, for the area, lacks significant information potential. As a result, Site 16PL229 is recommended ineligible for the NRHP and no further work is required.

Site 16PL230 (NOV 10-28)

5.228 Site 16PL230 was discovered in an area of dense secondary growth between the MRL to the north and Highway 11 to the south in Homeplace, Louisiana. One positive shovel test and two features comprise the site.

5.229 Site 16PL230 is representative of the remains of a pier and beam building and ancillary structure (Features 1 and 2). Although these features are in a deteriorated state, they retain integrity by providing an outline of the foundation elements for the former structures. Shovel

test delineation in the vicinity of the features did not reveal subsurface deposits in association with the structure remains. Although the features of the site retain integrity, no diagnostic evidence is present that would suggest a time period for the former building site. As a result, eligibility of the site remains undetermined. Further research is required to determine eligibility of the site.

Site 16PL231 Locus 2 (NOV 10-29)

5.230 Site 16PL231 Locus 2 was discovered on residential properties between the MRL and Highway 11 in Homeplace, Louisiana. The landscape across the site is predominantly secondary growth woodlands with dense undergrowth, with cleared areas containing maintained lawns to the east and west margins of the site. Site 16PL231 Locus 2 is comprised mostly of a 10- to 13-ft wide linear feature running east to west for the length of the site from a termination at the levee toe in the east to where it extends beyond the survey ROW to the west. A length of 600 ft was recorded from the levee toe westward to where the feature extended beyond the survey ROW. Shovel test delineation in the vicinity of the feature revealed shell and crushed stone fill, slag and cinder. A railroad spike and two wooden railroad ties *in situ* indicate that the feature is the remains of a former railroad bed.

5.231 Site 16PL231 Locus 2 is the remains of a section of the New Orleans to Fort Jackson and Grand Isle Railroad built in 1889 (Howe and Price 2011; Union Pacific 2011). This suspicion was further confirmed by comparison of field data to 1893 Mississippi River Commission Charts 80 and 81 (MRC 1893a and1893b) depicting the railroad corresponding to the same location of the abandoned rail bed feature.

5.232 Shovel testing only recovered rail bed material and no diagnostic artifacts that could be dated to the historic period of the railroad's use. The rail bed feature retains integrity and can be associated with events that have made a significant contribution to the broad patterns of our history (36 CFR 60.4 Criterion A), particularly the historic use of railroads and their importance to the socioeconomics of the late nineteenth to early twentieth century in Plaquemines Parish. As a result, Site 16PL231 is recommended eligible for the NRHP. A portion of the railroad remains in use upriver from Algiers to the Conoco Phillips Alliance Refinery in Belle Chasse, Louisiana. Downriver from the refinery, the railroad has been dismantled with only vestiges such as Site 16PL231, Locus 2 remaining. In the event that other sections of the historic railroad are encountered, it is recommended that these should be recorded as additional loci of an all-encompassing railroad site. Other such loci have been encountered in the proposed ROW of the current investigation, including Locus 1 discussed previously and Locus 3 described below.

Site 16PL232 (NOV 10-30)

5.233 Site 16PL232 was discovered on an unoccupied residential lot along Highway 11 in Homeplace. The section of Highway 11 passing Site NOV 10-30 runs immediately alongside the toe of the MRL to the north. The site was discovered on the opposite side (south) of Highway 11 from the MRL. The property on which the site is located is overgrown with grass and low undergrowth. A shell driveway crosses the property, leading to a concrete building slab and shed beyond the survey ROW. Site delineation was impeded by the pavement of Highway 11 to the north and the extent of the survey ROW to the south.

5.234 Site 16PL232 is representative of a scatter of potentially historic and modern artifacts expressed on the surface and subsurface. Although several of the artifacts could be associated with production periods spanning historic and modern years, none could be definitively assigned to an intact historic deposit. Deposits across the site appear highly disturbed, consisting of demolished building wreckage and a subsequent trash dump. Site 16PL232 is recommended ineligible for the NRHP and no further work is recommended.

NOV 11

5.235 A total of three sites were discovered in survey of NOV 11. As the official landfall location for Hurricane Katrina, Buras faced severe destruction during the storm. Vestiges of where homes and businesses once were and the wreckage of remaining buildings is commonplace in the area. Despite the extent of storm damage, the presence of debris in shovel test excavations was less prevalent than in populated areas upriver.

Site 16PL236 (NOV 11-1)

5.236 Site 16PL236 was found in the maintained backyard lawn of a residential and commercial property situated between the MRL to the north and Highway 11 beyond the survey ROW to the south in Buras. The property is covered with cut grass and sparse shade trees. A restored pier and beam house, metal Quonsett shed and concrete slab also occupy the property. Site delineation was impeded by the MRL to the north.

5.237 Site 16PL236 represents a scatter of historic and modern artifacts. Deposits across the site appear mixed with no clear historic depositional episode or sequence. As a result, 16PL236 is recommended ineligible for the NRHP.

Site 16PL237 (NOV 11-2)

5.238 Site 16PL237 is located on an occupied residential property across (south) Buras River Road from the MRL in Buras. The site is covered in a cut grass lawn with a large live oak and occupied mobile home. Site delineation was impeded to the south by the extent of the survey ROW and to the west by the mobile home.

5.239 Site 16PL237 consists of a scatter of potentially historic and modern artifacts. The majority of shovel tests excavated across the site exhibited disturbance with modern debris such as plastics, car parts, and blue tarp strands mixed into deposits. The three shovel tests defining the site contain artifacts with production date ranges extending from historic years to present with none providing conclusive evidence for being consistent with a historic deposit or depositional sequence. Therefore, Site 16PL237 is recommended ineligible for the NRHP, and no further work is recommended.

Site 16PL238 (NOV 11-3)

5.240 Site 16PL238 was discovered on the edge of a horse paddock located on a property with frontage on Highway 11 and abutting the MRL in the rear (north). The landscape across the site consists of a fenced enclosure with cut grass and pecan trees. Previous agricultural use of the property is evident by undulating rows spaced every 33 ft across the ground surface. Site delineation was impeded to the north by the MRL.

5.241 Site 16PL238 consists of a discrete scatter of historic, potentially historic and modern artifacts. Artifacts are consistent with utilitarian, leisure, and architectural usage. Given the undulating ground surface and evidence for earth-moving landscape manipulation across the site, the integrity of these deposits is questionable. Further research is required to determine the eligibility of Site 16PL238, and as a result the eligibility of the site remains undetermined.

NOV 12

5.242 Three positive shovel tests were encountered during a transect survey of NOV 12. Further shovel testing in delineation of the three shovel tests did not encounter additional cultural deposits, resulting in the determination that these positive shovel tests are representative of IOs and not significant. No additional historic or archaeological resources were discovered as a result of this investigation.

NOV 13

5.243 NOV 13 consists of restoration, armoring, and repairs to the Empire floodgate and floodwalls on the west bank setback levee, which are tied into the existing levee. The survey ROW for NOV 13 consists of open water and earthen fill. No subsurface survey in association with NOV 13 was conducted as the location possesses low potential for intact deposits.

NOV 14

5.244 NOV 14 consists of restoring and armoring the Empire Lock floodwalls on the west bank MRL. The floodwalls are at or near design grade. The TSP for NOV 14 would be to armor the lock floodwalls within the existing ROW by grouting or other repairs. No subsurface survey was required for the proposed restoration and armoring of NOV 14.

Site 16PL206 (NOV 10-1)

5.245 Site 16PL206 was encountered during shovel transects paralleling the protected side of the Point Michel floodwall in Happy Jack, Louisiana. The site is truncated on its northeastern boundary by the MRL and along its southwestern boundary by the extent of the survey ROW due to right of entry constraints. Site delineation was further inhibited along the southeastern extent of the site by a residential property covered in broken concrete, aggregate, and what appeared to be a home-based sand and gravel operation. The landscape across the site consists of standing hardwood trees and overgrown secondary vegetation across an unoccupied lot on the northwestern half of the site and a maintained lawn in the backyard of a residence covering the southeastern half of the site. In the extreme western extent of the site, a brick pile and associated brick scatter (Feature 1) were encountered in a dense stand of undergrowth. Artifacts were recovered from a total of 38 shovel tests across the site.

5.246 Site 16PL206 consists of a scatter of historic and modern artifacts consistent with domestic utilitarian and architectural use. It is likely that 16PL206 represents a residential occupation occurring between the mid-nineteenth century and present. Cultural deposits at this site appear to have integrity, though some mixing of modern debris was noted in a few of the shovel tests. This site may hold information about the potential occupation at the location during the mid-nineteenth century through the twentieth century in Happy Jack. Further testing is recommended to determine eligibility of Site 16PL206.

NOV 16

5.247 Survey transects along NOV 16 resulted in the delineation of four sites. NOV 16 passes the town of Empire, which was severely damaged during Hurricane Katrina. The wreckage and vestiges of buildings that were once homes and businesses marked the landscape. Piled up debris and scattered cultural effects were commonly encountered in unmaintained vegetated areas.

Site 16PL233 (NOV 16-1)

5.248 Site 16PL233 was encountered in the maintained backyard lawn of a residential property. A concrete slab, travel trailer, carport and shed are located on the property. Site delineation was impeded to the north and east by the MRL.

5.249 Site 16PL233 is representative of a scatter of historic and modern artifacts. Of the two positive shovel tests excavated across the site, one contains potentially intact deposits from the early to mid-twentieth century. For the area, the information potential at 16PL233 is minimal. As a result, 16PL233 is recommended ineligible for the NRHP and no further work is recommended.

Site 16PL231 Locus 3 (NOV 16-2)

5.250 Site 16PL231 Locus 3 was discovered in a strip of mowed grass and extends into an otherwise unmaintained and unoccupied parcel of land, predominantly overgrown with trees and dense undergrowth between the MRL to the northeast and Highway 11 to the southwest. One positive shovel test was encountered in delineation of the site. The main defining characteristic of the site consists of a linear embankment of crushed shell approximately 330 ft in length extending northwest to southeast on an approximately 125-degree bearing. An iron rail base plate was observed along the embankment, suggesting that the feature was railroad related, particularly to the New Orleans to Fort Jackson and Grand Isle Railroad built in 1889 and encountered upriver at Site 16PL231, Loci 1 and 2 described previously.

5.251 Site 16PL231, Locus 3 is the remains of a section of the New Orleans to Fort Jackson and Grande Isle Railroad built in 1889 (Howe and Price 2011; Union Pacific 2011). This suspicion was further confirmed by comparison of field data to 1893 Mississippi River Commission Charts 80 and 81 (MRC 1893a and 1893b) depicting the railroad corresponding to the same location of the abandoned rail bed feature.

5.252 Shovel testing only recovered rail bed material and no diagnostic artifacts that could be dated with certainty to the historic period of the railroad's use. The rail bed feature retains integrity and can be associated with events that have made a significant contribution to the broad patterns of our history (36 CFR 60.4 Criterion A), particularly the historic use of railroads and their importance to the socioeconomics of the late nineteenth to early twentieth century in Plaquemines Parish.

5.253 As a result, Site 16PL231 is recommended eligible for the NRHP. A portion of the railroad remains in use upriver from Algiers to the Conoco Phillips Alliance Refinery in Belle Chasse, Louisiana. Downriver from the refinery the railroad has been dismantled with only vestiges such as Site 16PL231 remaining. In the event that other sections of the historic railroad

are encountered, it is recommended that these should be recorded as additional loci of an all-encompassing railroad site. Other such loci have been encountered in the proposed ROW of the current investigation, including 16PL231, Locus 1 and Locus 2 described previously.

Site 16PL234 (NOV 16-3)

5.254 Site 16PL234 was encountered on an unoccupied and unmaintained residential property located between the MRL to the northeast and Highway 11 to the southwest. The landscape across the site included overgrown groundcover such as grass and weeds and two large oak trees. The property appears to be a former residence with the remains of concrete building footings found on the surface. Three positive shovel tests were excavated in delineation of the site. Delineation was discontinued to the north and east due to the presence of the MRL.

5.255 Site 16PL234 is representative of a late nineteenth century to modern scatter of artifacts likely associated with a demolished house location. For the area, the artifact scatter is limited in research potential, and no discernable depositional episode or sequence could be derived from the deposits encountered. As a result, Site 16PL234 is recommended ineligible for the NRHP and no further work is recommended.

Site 16PL235 (NOV 16-4)

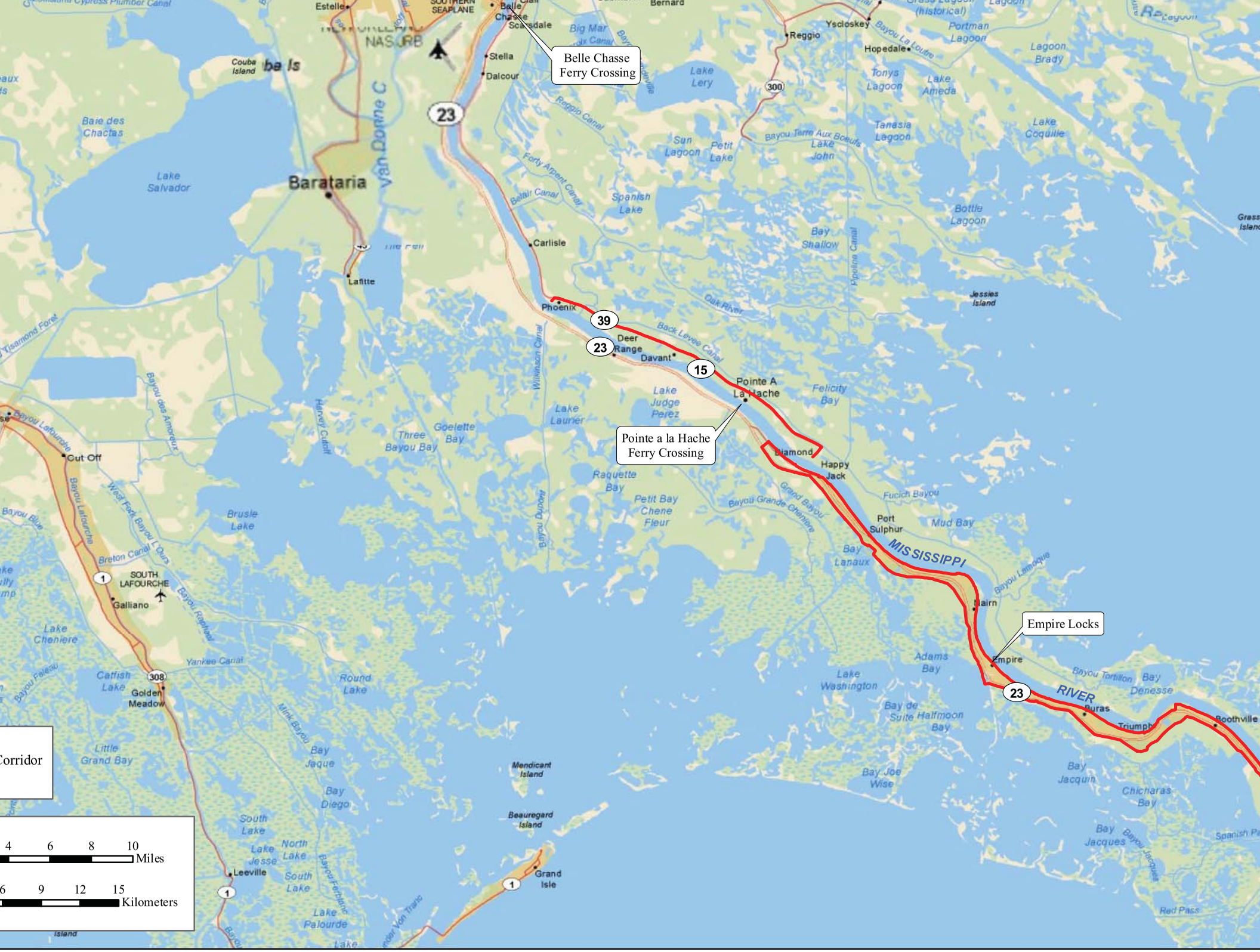
5.256 Site 16PL235 was discovered on a property covered in overgrown grasses and pioneer plant species between the MRL to the northeast and Highway 11 to the southwest. Site delineation was limited to the northeast by the presence of the MRL.

5.257 Site 16PL235 represents a scatter of potentially historic to modern artifacts. The presence of a railroad spike, coal and cinder suggests a proximal association with the New Orleans to Fort Jackson and Grand Isle Railroad built in 1889, although no intact deposit or feature was encountered to define this relationship. Historic maps depict the railroad farther to the north under the present MRL footprint. Among the non-railroad related artifacts recovered, no intact depositional event or sequence could be derived from the data collected. As a result, Site 16PL235 is recommended ineligible for the NRHP and no further work is recommended.

TRANSPORTATION

5.258 This resource is important for a variety of reasons, among them a series of connecting deep-draft ports extending from the mouth of the Mississippi River and the Gulf of Mexico to points north of the City of Baton Rouge, Louisiana, more than 200 miles upstream. This transportation network includes railways, shallow-draft waterways, and limited access highways, as well as the streets and bridges supporting the local communities and evacuation routes needed in response to hurricanes that pass through the region. The transportation resource is important to the public because of the increase in traffic in relation to existing traffic load and capacity and a reduction in alternative transportation options.

5.259 The west bank project area is accessed via LA 23 and the east bank project area is accessed via LA 39 (Figure 5-3). LA 23 is a north-south Louisiana state highway that serves Plaquemines and Jefferson parishes. It spans 74.02 miles in roughly a southeast/northwest direction. LA 23 connects the cities of Gretna and Venice. Between Belle Chasse and Venice, the highway serves as the main road along the west bank of the Mississippi River.


Belle Chasse Ferry Crossing
Pointe a la Hache Ferry Crossing
Empire Locks
MISSISSIPPI
RIVER
Corridor
4 6 8 10 Miles
6 9 12 15 Kilometers
Estelle
Belle Chasse
Scarsdale
Stella
Dalcour
Barataria
Lafitte
Carlisle
Phoenix
Deer Range
Davant
Pointe A La Hache
Diamond
Happy Jack
Port Sulphur
Buras
Triumph
Boothville
Empire
Venice
Cut Off
Galliano
SOUTH LAFOURCHE
Golden Meadow
Leeville
Grand Isle
Reggio
Yscloskey
Hopedale
Bernard
Lake Salvador
Lake Cheniere
Little Grand Bay
Catfish Lake
Round Lake
Brusle Lake
Three Bayou Bay
Goelette Bay
Lake Laurier
Lake Judge Perez
Raquette Bay
Petit Bay Chene Fleur
Bay Lanaux
Lake Washington
Bay de Suite
Halfmoon Bay
Bay Joe Wise
Bay Jacquin
Chicharas Bay
Bay Jacques
Bay Denesse
Mud Bay
Felicity Bay
Bay Shallow
Lake Lery
Lake Ameda
Tonys Lagoon
Portman Lagoon
Lagoon Brady
Lake Coquille
Bottle Lagoon
Jessies Island
Mendicant Island
Beauregard Island
Grass Island
Red Pass
Spanish Pass
Van Dorne C
Baie des Chactas
Couba Island
Big Mar
Reggio Canal
Forty Arpent Canal
Belair Canal
Spanish Lake
Sun Lagoon
Petit Lake
Lake John
Tanasia Lagoon
Bayou Terre Aux Boeufs
Oak River
Back Levee Canal
Wilkinson Canal
Harvey Cutoff
Bayou des Amoreux
Bayou Lafourche
West Fork Bayou L'Ours
Breton Canal
Bayou Raphael
Yankee Canal
Bayou Blue
Bayou Dupont
Grand Bayou
Bayou Grande Cheniere
Fucich Bayou
Bayou Lamoque
Bayou Tortillon
Mink Bayou
Bay Jaque
Bay Diego
South Lake
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Lake Palourde
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Pipeline Canal
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LA 23 runs through the small rural towns of Jesuit Bend, Naomi, Myrtle Grove, West Pointe à la Hache, Port Sulphur, Nairn, Empire, Buras, Triumph, and Boothville. With the exception of the portion running through Port Sulphur, the entire highway is four lanes, although it is not controlled access. It is a critical hurricane evacuation route for inhabitants along the west bank of the Mississippi River. Ninety percent of the traffic accessing the west bank of Plaquemines Parish utilizes this highway during both daily traffic conditions and emergency evacuation periods. LA 23 is used by large trucks daily, hauling freight to and from Venice to supply local industry. Annual average daily traffic (AADT) count data indicates that between 2003 and 2006 there was a general decrease in traffic in southern Plaquemines Parish. However, there was a general increase in traffic between 2006 and 2008 as the area began to rebuild after Hurricane Katrina (Louisiana Department of Transportation [LADOTD] 2010).

5.260 The project area along the east bank is not highly developed, and most development that does exist occurs towards the Mississippi River and Parish Highway (Hwy) 15, while the back levee is along LA 39. On the east bank, near Poydras, LA 39 becomes a two-lane, undivided road that runs along the east bank of the Mississippi River. At Phoenix, LA 39 veers eastward and runs along the back levee, ending at the Bohemia Spillway. Also at Phoenix, Hwy 15 connects with LA 39 and runs along the east bank, again joining with LA 39 at the Bohemia Spillway. The two roads together form a loop around the land area within the confines of the levees. The AADT count data indicate that between 2003 and 2006 there was a 26% decrease in traffic entering the project area via LA 39. Between 2006 and 2008 there was a 14% increase in traffic; however, this is still below pre-Katrina levels (LADOTD 2010).

5.261 The Mississippi River from Baton Rouge to the Gulf of Mexico is a 236-mile deep-draft waterway and the core of waterborne commerce with approximately 200 hundred million tons of cargo moving through the river annually. Mississippi River infrastructure at Louisiana ports south of Baton Rouge and private terminals composes one of the world's largest seaport complexes. Plaquemines Parish, the eighth largest port in the U.S., is noted for its exports of coal, petro-chemical, and grain to world markets and can handle approximately 62 million tons of cargo yearly. The Plaquemines Port, Harbor and Terminal District, is responsible for the development of deep-draft waterways in Plaquemines Parish and has jurisdiction over 120 miles of the Mississippi River from RM 81.7 to the Gulf of Mexico (World Port Source 2010).

5.262 There are two ferry boat crossings in the parish; one from Belle Chasse to Scarsdale and one from East Pointe à la Hache to West Pointe à la Hache (see Figure 5-3). The Belle Chasse ferry operates every half hour from 5:00 am to midnight. The East Pointe à la Hache ferry operates every hour from 6:00 am to 10:00 pm (Plaquemines Parish 2010).

5.263 Empire is a key fishing port in southeastern Louisiana because of its position as a gateway to prime fishing grounds along the Gulf of Mexico. A vessel navigational lock on the Empire Canal and a companion navigational lock on the river's East Bank at Ostrica provide vessels access to the Mississippi River and to fishing grounds to the north and east. It is the only set of navigational locks available for boats to cross the river below New Orleans (Tesvich 2008). The USACE maintains a shallow-draft channel from Empire to the Gulf of Mexico.

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

5.264 The USACE is obligated under ER 1165-2-132 to assume responsibility for reasonable identification and evaluation of all HTRW contamination within the vicinity of the project corridor. ER 1165-2-132 identifies USACE's HTRW policy to avoid use of project funds for HTRW removal and remediation activities. Costs for necessary special handling or remediation of wastes (*e.g.*, Resource Conservation and Recovery Act [RCRA] regulated), pollutants and other contaminants, which are not regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), would be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

5.265 A Phase I Environmental Site Assessment (ESA) was conducted on behalf of USACE for the entire NOV project corridor by Quaternary Resource Investigations, LLC (QRI) in accordance with American Society for Testing and Materials (ASTM) standard ASTM E1527-05. For a detailed description of the recognized environmental conditions (RECs) identified by QRI in a particular reach of the NOV levee project corridor, the two-volume ESA report is incorporated by reference (USACE 2010b) and can be found in Appendix H. Numerous environmental conditions with possible risk to the construction and maintenance of the levee system were identified in the report. Most of the risk sites were of the type that could be avoided by equipment used to construct the NOV levee project. There were many unidentified risk conditions identified in the form of unmarked barrels and tanks, abandoned boats and barges, and unidentified dump sites associated with Hurricane Katrina, that may require action if they are located within the active construction corridor. Such conditions should be evaluated on a site-by-site basis once construction perimeters are established with proper removal and disposal dictated by each evaluation.

5.266 Particular attention should be given to the following sites located within the potential construction corridor, as identified in the Environmental Site Assessment (see Appendix H):

- NOV 08, REC 2 – Abandoned drum with chemical contents
- NOV 10, REC 9 – Abandoned drum with hydraulic oil contents, two tanks
- NOV 10, REC 11 – Aboveground storage tanks (ASTs) with diesel/gasoline contents
- NOV 10, REC 12 – Abandoned underground storage tanks (USTs)
- NOV 10, REC 15 – AST with cooking oil contents
- NOV 10, REC 19 – Abandoned drum and AST
- NOV 11, REC 18 – Possible abandoned USTs

5.267 Many potential risk conditions exist in the form of buried and exposed pipelines carrying hazardous or petroleum products, and these can be avoided by observing excavation and equipment movement restrictions dictated by the pipeline owners.

Section 122 Items

5.268 Section 122, 1970 River and Harbors Act - P.L. 91-116, necessitate addressing the impacts of each proposed plan upon the following items: Noise, Air Quality, Aesthetic Value,

Socioeconomics, and Environmental Justice. The succeeding paragraphs identify these items and briefly explain how they relate to the project-affected area.

NOISE

5.269 This resource is institutionally significant because of the Noise Control Act of 1972. Compliance with surface carrier noise emissions is technically significant. Exposure of persons to noise or generation of noise levels in excess of applicable standards is publicly significant due to health reasons and annoyance.

5.270 Noise is generally described as unwanted sound, which can be based either on objective effects (*i.e.*, hearing loss, damage to structures, *etc.*) or subjective judgments (*e.g.*, community annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the decibel scale is referred to as sound level. The lower threshold of human hearing is approximately 0 dB, and the threshold of discomfort or pain is around 120 dB.

5.271 Noise levels occurring at night generally produce a greater annoyance than do the same levels occurring during the day. It is generally agreed that people perceive intrusive noise at night as being 10 dBA (A-weighted decibel is a measure of noise at a given, maximum level or constant state level) louder than the same level of intrusive noise during the day, at least in terms of its potential for causing community annoyance. This perception is largely because background environmental sound levels at night in most areas are also about 10 dBA lower than those during the day.

5.272 Acceptable noise levels have been established by the U.S. Department of Housing and Urban Development (HUD) for construction activities in residential areas:

Acceptable (not exceeding 65 dBA) – The noise exposure may be of some concern but common building construction will make the indoor environment acceptable and the outdoor environment will be reasonably pleasant for recreation.

Normally Unacceptable (above 65 but not greater than 75 dBA) – The noise exposure is significantly more severe; barriers may be necessary between the site and prominent noise sources to make the outdoor environment acceptable; special building constructions may be necessary to ensure that people indoors are sufficiently protected from outdoor noise.

Unacceptable (greater than 75 dBA) – The noise exposure at the site is so severe that the construction costs to make the indoor noise environment acceptable may be prohibitive and the outdoor environment would still be unacceptable (HUD 1984).

5.273 The sound level most commonly used for noise planning purposes is 65 dBA and represents a compromise between community impact and the need for activities like construction. USEPA identified 55 dBA as a level below which there is no adverse impact (USEPA 1974).

5.274 As a general rule of thumb, noise generated by a stationary noise source, or "point source," will decrease by approximately 6 dBA over hard surfaces and 9 dBA over soft surfaces for each doubling of the distance. For example, if a noise source produces a noise level of 85 dBA at a reference distance of 50 ft over a hard surface, then the noise level would be 79 dBA at a distance of 100 ft from the noise source, 73 dBA at a distance of 200 ft, and so on. To estimate the attenuation of the noise over a given distance the following relationship is utilized (California Department of Transportation 1998):

Equation 1: $dBA_2 = dBA_1 - 20 \log (d_2/d_1)$, where:

- dBA_2 = dBA at distance 2 from source (predicted)
- dBA_1 = dBA at distance 1 from source (measured)
- d_2 = Distance to location 2 from the source
- d_1 = Distance to location 1 from the source

AIR QUALITY

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

Regulatory Setting

5.276 The enactment of the CAA of 1970 resulted in the NAAQS and SIPs. The USEPA established NAAQS for specific pollutants to determine the maximum levels of background pollution that are considered safe, with an adequate margin of safety, to protect public health and welfare. The NAAQS standards are classified as either "primary" or "secondary" standards. The major pollutants of concern, or criteria pollutants, are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 2.5 microns (PM-2.5) and less than 10 microns (PM-10), and lead (Pb). The NAAQS are included in Table 5-14.

5.277 Areas that do not meet these NAAQS standards are called non-attainment areas or maintenance areas; areas that meet both primary and secondary standards are known as attainment areas. When air quality within a non-attainment area improves, the area is redesignated as a maintenance area. The air quality managers in maintenance areas develop maintenance plans to ensure that air quality does not exceed the NAAQS.

Conformity Determination

5.278 The Federal Conformity Final Rule (40 CFR Parts 51 and 93) states that Federal actions must conform with Federal air quality regulations presented in the CAA. The rule mandates that a conformity analysis must be performed when a Federal action generates air pollutants in a region designated as non-attainment or maintenance area for one or more NAAQS.

Table 5-14. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Times
CO	9 ppm (10 mg/m^3)	8-hour [1]	None	
	35 ppm (40 mg/m^3)	1-hour [1]		
Pb	0.15 µg/m^3 [2]	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m^3	Quarterly Average	Same as Primary	
NO_2	53 ppb [3]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [4]	None	
PM-10	150 µg/m^3	24-hour [5]	Same as Primary	
PM-2.5	15.0 µg/m^3	Annual [6] (Arithmetic Average)	Same as Primary	
	35 µg/m^3	24-hour [7]	Same as Primary	
O_3	0.075 ppm (2008 std)	8-hour [8]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary	
	0.12 ppm	1-hour [10]	Same as Primary	
SO_2	0.03 ppm	Annual (Arithmetic Average)	0.5 ppm	3-hour [1]
	0.14 ppm	24-hour [1]		
	75 ppb [11]	1-hour	None	

Source: USEPA 2010a

Units of measure for the standards are parts per million (ppm) by volume, parts per billion (ppb - 1 part in 1,000,000,000) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3).

[1] Not to be exceeded more than once per year.

[2] Final rule signed October 15, 2008.

[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard

[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).

[5] Not to be exceeded more than once per year on average over 3 years.

[6] To attain this standard, the 3-year average of the weighted annual mean PM-2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

(c) USEPA is in the process of reconsidering these standards (set in March 2008).

[10] (a) USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").

(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.

[11] (a) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

5.279 A conformity analysis determines whether a Federal action meets the requirements of the general conformity rule. It requires the responsible Federal agency to evaluate the nature of the Proposed Action and associated air pollutant emissions, calculate emissions as a result of the Proposed Action, and mitigate emissions if *de minimis* thresholds (100 tons per year) are exceeded. If the emissions exceed the *de minimis* thresholds, the proponent is required to conduct a conformity analysis and implement appropriate mitigation measures.

5.280 The entire NOV project site is located within Plaquemines Parish, which is in attainment for all NAAQS (USEPA 2010b). Therefore, the air emissions generated by the Proposed Action would not trigger a conformity determination even if they exceed *de minimis* levels.

Greenhouse Gases and Climate Change

5.281 Global climate change refers to a change in the average weather on the earth. Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. They include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), fluorinated gases including chlorofluorocarbons (CFC) and hydrochlorofluorocarbons (HFC), halons, as well as ground-level O_3 (California Energy Commission 2007).

5.282 The major GHG-producing sectors in society include transportation, utilities (*e.g.,* coal and gas power plants), industry/manufacturing, agriculture, and residential. End-use sector sources of GHG emissions include transportation (41%), electricity generation (22%), industry (21%), agriculture and forestry (8%), and other (8%) (California Energy Commission 2007). The main sources of increased concentrations of GHG due to human activity include the combustion of fossil fuels and deforestation (contributing CO_2), livestock and rice farming, land use and wetland depletions, landfill emissions (contributing CH_4), refrigeration system and fire suppression system use and manufacturing (contributing CFC), and agricultural activities, including the use of fertilizers (California Energy Commission 2007).

Executive Order 13514

5.283 EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance,* signed on October 5, 2009, directs Federal agencies to reduce GHG emissions and address climate change in NEPA analysis. It expands upon the energy reduction and environmental performance requirements of EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*. It identifies numerous energy goals in several areas, including GHG management, management of sustainable buildings and communities, and fleet and transportation management.

Final Mandatory GHG Inventory Rule

5.284 In response to the Consolidation Appropriations Act (House Resolution 2764; P.L. 110–161), USEPA has issued the Final Mandatory Reporting of Greenhouse Gases Rule. The rule requires large sources that emit 27,557 tons or more per year of GHG emissions to report GHG emissions in the U.S., collect accurate and timely emissions data to inform future policy decisions, and submit annual GHG reports to the USEPA. The final rule was signed by the USEPA administrator on September 22, 2009, published in the *Federal Register* on October 30, 2009, and made effective December 29, 2009.

5.285 The GHGs covered by EO 13514 are CO_2, CH_4, N_2O, HFCs, perfluorpcarbons, and sulfur hexafluoride. These GHGs have varying heat-trapping abilities and atmospheric lifetimes. Carbon dioxide equivalency (CO_2e) is a measuring methodology used to compare the heat-trapping impact from various greenhouse gases relative to CO_2. Some gases have a greater global warming potential than others. Nitrous oxides (NO_x), for instance, have a global warming potential that is 310 times greater than an equivalent amount of CO_2 and C H_4 is 21 times greater than an equivalent amount of CO_2 (CEQ 2010).

GHG Threshold of Significance

5.286 The CEQ provided draft guidelines for determining meaningful GHG decision-making analysis (2010). The CEQ GHG guidance is currently undergoing public comment at this time; however, the draft guidance states that if the Proposed Action would be reasonably anticipated to cause direct emissions of 27,557 tons or more of CO_2e GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public. For long-term actions that have annual direct emissions of less than 27,557 tons of CO_2e, CEQ encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis. CEQ does not propose this as an indicator of a threshold of significant effects, but rather as an indicator of a minimum level of GHG emissions that may warrant some description in the appropriate NEPA analysis for agency actions involving direct emissions of GHGs (CEQ 2010).

AESTHETIC VALUE (VISUAL RESOURCES)

5.287 This resource's institutional significance is derived from laws and policies that affect visual resources, most notably NEPA, the Coastal Barrier Resources Act of 1990, and National and Local Scenic Byway Programs. Aesthetic resources are technically significant because of visual accessibility to unique combinations of geological, botanical, and cultural features that may be an asset to a study area. Public significance is based on expressed public perceptions and professional evaluation.

5.288 The project area's current visual landscape is dominated by flood risk reduction features, which include earthen berm levees, previous borrow areas used for levee-building material, and pump stations. The earthen levees consist of maintained turf grasses with very few trees. Linear, man-made canals occur on either side of the levee as a result of the construction of borrow areas surrounding the levee. The flood side of the levees contains marsh and BLH, but these habitats cannot be seen from the protected side due to the current flood risk reduction measures. The surrounding area exhibits a natural landscape that has been altered by agricultural, rural, and urban development. In many project segments, the project area is remote and/or inaccessible to the general public, as no public access roads are available. Unlike other parts of the Greater New Orleans Area, the levees in Plaquemines Parish are not frequently used for recreation and other outdoor activities. The project area would be largely uninhabitable without the current levee system in place.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

5.289 EO 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations*, requires Federal agencies to ensure rights established under Title VI of the

Civil Rights Act of 1964 when analyzing environmental effects. USACE and most Federal agencies determine impacts on low-income and minority communities as part of the NEPA compliance process. Additionally, the Department of Defense's Strategy on Environmental Justice (March 24, 1995) provides a method to address Environmental Justice. Environmental Justice analysis will identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of the project on minority and low-income populations. The methodology to accomplish this includes identifying low-income and minority populations within the project area, as well as community outreach activities such as environmental justice stakeholder meetings.

5.290 Within this section is an overview of social patterns and neighborhoods located within the NOV project area and the analysis to address the NOV levee project's potential to affect demographic patterns and other social and economic characteristics within the area. Additionally, within this section is an overview of the variables which are indicators of low-income and minority populations which aid in determining if a community is subject to environmental justice issues.

LOCAL GOVERNMENT FINANCE, TAX REVENUES, AND PROPERTY VALUES

5.291 The local parish government relies primarily on oil and gas revenue and taxes. Fluctuations in oil and gas prices affected the 2009 general fund (Plaquemines Parish Government [PPG] 2009). The collection of business, sales, and property taxes in support of community services and infrastructure is an important socioeconomic resource.

5.292 The average value of owner-occupied housing units was estimated at $190,300 in Plaquemines Parish in 2008 (U.S. Census Bureau 2008). The number of occupied houses decreased by 17% from 2000 to 2008, which creates a very limited tax base for the study area (U.S. Census Bureau 2000 and 2008).

5.293 Property values are an important socioeconomic resource that ensures community stability and fosters community cohesion and regional growth. The devastation from the 2005 hurricane season and hurricanes Gustav and Ike in 2008 have greatly influenced property values. Many individuals have not rebuilt on their property and have instead chosen to place mobile homes on their land. The values of owner-occupied housing have increased between 2000 and 2008 by 72%; however, if the vacant housing that had significant damage from the 2005 and 2008 hurricanes is included, there would likely be a significant decrease in the median and average housing values between 2000 and 2008.

5.294 Data for the median value of specified owner-occupied housing units were available for 2000 for Plaquemines Parish, the State of Louisiana, and at the census block group level (U.S. Census Bureau 2000a and 2000b), and estimates are available for 2010 (Environmental Systems Research Institute [ESRI] 2010) (Tables 5-15 and 5-16). The values only include specific owner-occupied housing units, one-family houses, on less than 10 acres without businesses on the property. Data do not include mobile homes, houses with a business, houses on more than 10 acres or multi-unit structures. The median value of the sampled owner-occupied homes in the project area increased in value from 2000 to 2010, and increased more than the value at the state or parish level.

Table 5-15. 2000 and 2010 Median Value of Specified Owner-occupied Housing Units in Plaquemines Parish and the State of Louisiana

Location	Median Value		Percent Change
	2000	2010	
Plaquemines Parish	$110,100	$111,475	1.25
Louisiana	$73,539	$118,755	53.16

U.S. Census Bureau 2000a, 2000b and ESRI 2010.

Table 5-16. Median Value of Owner-Occupied Homes for the Year 2000 and 2010

Segment	Census Tract and Block Group	Median Value		Percent Change
		2000	2010	
NOV 01	501.3	$31,700	$41,905	32.2
NOV 02	501.3	$31,700	$41,905	32.2
NOV 05	504.1	$48,500	$69,423	43.1
NOV 06	505.1	$46,900	$68,095	45.2
	505.2	$48,600	$67,778	39.5
	505.3	$47,500	$64,375	35.5
	506.1	$43,500	$60,455	39.0
	506.3	$14,200	$19,643	38.3
NOV 07	506.1	$43,500	$60,455	39.0
	506.2	$35,500	$38,125	7.4
	507.1	$14,200	$19,643	38.3
	507.2	$28,200	$40,278	42.8
	507.3	$42,100	$56,786	34.9
	507.4	$27,500	$36,875	34.1
NOV 08	507.4	$27,500	$36,875	34.1
	508.1	$10,000	$11,250	12.5
	508.2	$34,600	$51,875	49.9
	508.3	$35,600	$54,800	53.9
NOV 09	504.1	$48,500	$69,423	43.1
NOV 10	505.1	$46,900	$68,095	45.2
	505.2	$48,600	$67,778	39.5
	505.3	$47,500	$64,375	35.5
	506.1	$43,500	$60,455	39.0
NOV 11	507.2	$28,200	$40,278	42.8
NOV 12	507.3	$42,100	$56,786	34.9
	507.4	$27,500	$36,875	34.1
	508.2	$34,600	$51,875	49.9
	508.3	$35,600	$54,800	53.9
NOV 13	506.3	N/A	N/A	N/A
NOV 14	506.1	$43,500	$60,455	39.0
	506.2	$35,500	$38,125	7.4
NOV 15	505.1	$46,900	$68,095	45.2
	507.4	$27,500	$36,875	34.1
	508.1	$10,000	$11,250	12.5
	508.3	$35,600	$54,800	53.9

Table 5-16, continued

Segment	Census Tract and Block Group	Median Value		Percent Change
		2000	2010	
NOV 16	506.1	$43,500	$60,455	39.0
	506.2	$35,500	$38,125	7.4
	507.1	$14,200	$19,643	38.3
	507.2	$28,200	$40,278	42.8

Source: U.S. Census Bureau 2000c, ESRI 2010.
N/A – Not applicable because there were no owner-occupied homes during 2000 or 2010 or none were randomly sampled.

DISPLACEMENT OF BUSINESSES AND FARMS AND EMPLOYMENT

5.295 Fisheries and agriculture are the primary industries in Plaquemines Parish. The marine industry, farming, commercial fishing, shipping, and construction are other businesses and industry in the parish. The parish has the infrastructure for the refinement and storage of oil and gas. The marine industry provides several jobs including commercial fishing, ports, commercial seafood harvesting. Plaquemines Parish government is looking toward bringing renewable energy to the parish including the use of wind turbines in the waters off the coast.

5.296 Plaquemines Parish is the largest citrus producer in the state with 500 acres of the parish in production, producing 62% of the states citrus in 2009 (PPG 2010a). The BP Deepwater Horizon oil spill did not affect citrus production in the state; however, hurricanes Katrina, Rita, Ike, and Gustav did affect crops. Many trees were lost or damaged during the hurricanes (Alexander-Bloch 2010). In 2007, the value of the 100 growers' farms in the parish was $4 million (LSU AgCenter as cited in Alexander-Bloch 2010). Most of the farms are located in the northern part of the parish, but a few are located near the NOV project corridor in the towns of Buras and Empire.

5.297 The BP Deepwater Horizon oil spill that occurred on April 20, 2010, affected other local homes, businesses, and farms. A moratorium was placed on oil drilling and refinement for several months. Individuals and businesses in 34 parishes in Louisiana, including Plaquemines Parish, were affected by the BP Deepwater Horizon oil spill. The Small Business Administration (SBA) opened an Economic Injury Disaster Loan program for small businesses affected financially by the spill and set up business recovery centers in each of the affected parishes/counties. Eligible small businesses include those engaged in shrimping, crabbing, and oyster fishing in the waters affected by the closure, or those dependent on the catching or sale of shrimp, crab, and oysters. Further, small businesses who supply fishing gear and fuel, docks, boatyards, processors, wholesalers, shippers, retailers, and other small businesses dependent on revenue from fishing, recreational, and sports fishing and small coastal businesses were affected (SBA 2010a). Since May 5, 2010, SBA has approved more than $6.8 million to assist Louisiana's small businesses impacted by the BP Deepwater Horizon oil spill (SBA 2010b). Detailed impacts from the oil spill on businesses and employment have not been determined at this time.

PUBLIC SERVICES AND FACILITIES

5.298 This socioeconomic resource provides needed services for the health and safety of the general public.

5.299 Since 2005, new libraries and community centers are being constructed in Plaquemines Parish. The Port Sulphur Library was relocated and a new building was constructed. Four community centers were built or will be built in Plaquemines Parish: 1) Port Sulphur Community Center, 2) Reverend Percy M. Griffin Community Center, 3) Boothville-Venice Community Center, and 4) Buras Community Center. Although outside of the project area, the YMCA is building a fifth community center in Belle Chasse. The Port Sulphur and Buras community centers have already been constructed (Sercovich 2010a). The construction of the centers was funded by the Plaquemines Legacy Campaign, a public-private partnership. YMCA facilities will be installed at each of the centers for 2 years (Robinson 2010). The community centers will also serve as emergency centers to provide a safe refuge from floods, storms, and other disasters. A new senior center was opened in Port Sulphur and provides senior activities and daily lunch Monday through Friday. The locations of public facilities can be seen in Figure 5-4.

Police and Fire Protection

5.300 Following Hurricane Katrina, police and fire services were minimal. However, brand-new fire stations are now being built throughout the parish. There are 12 fire departments parish-wide, and six newly built fires stations were raised to FEMA-approved elevations. They also have backup generators that are hurricane proof with new equipment and the latest technology. Volunteer services are still available; however, the Plaquemines Parish Board recently approved the hiring of paid operators for some fire departments; each station will have two paid truck operators working around the clock.

5.301 The Sheriff's Office provides law enforcement in the parish. They also have a Marine Search and Rescue Division that patrol recreational and commercial waterways. There are three patrol districts with three captains and 58 deputies (PPG 2010b).

Schools

5.302 Several schools are adjacent to the NOV project area. There are three schools on the West Bank and one school on the East Bank. Two out of the three schools on the West Bank are elementary schools (Boothville-Venice and South Plaquemines) and one is a high school (South Plaquemines High). Phoenix High School, the only public school on the East Bank, services grades K through 12th grade.

5.303 Boothville-Venice Elementary School is located adjacent to and between NOV 12 and NOV 08 (see Figure 5-4). Following Hurricane Katrina, the Boothville-Venice High School was reopened as the elementary school. The school was one of the only buildings to withstand the hurricane without significant damage. Enrollment at the elementary school in 2009 was 392 children (PPG 2010b).

5.304 Three flooded high schools were consolidated following Hurricane Katrina (Boothville-Venice High School, Buras High School, and Port Sulphur High School Science Building) to make the South Plaquemines High School. The high school is currently located at the site of the

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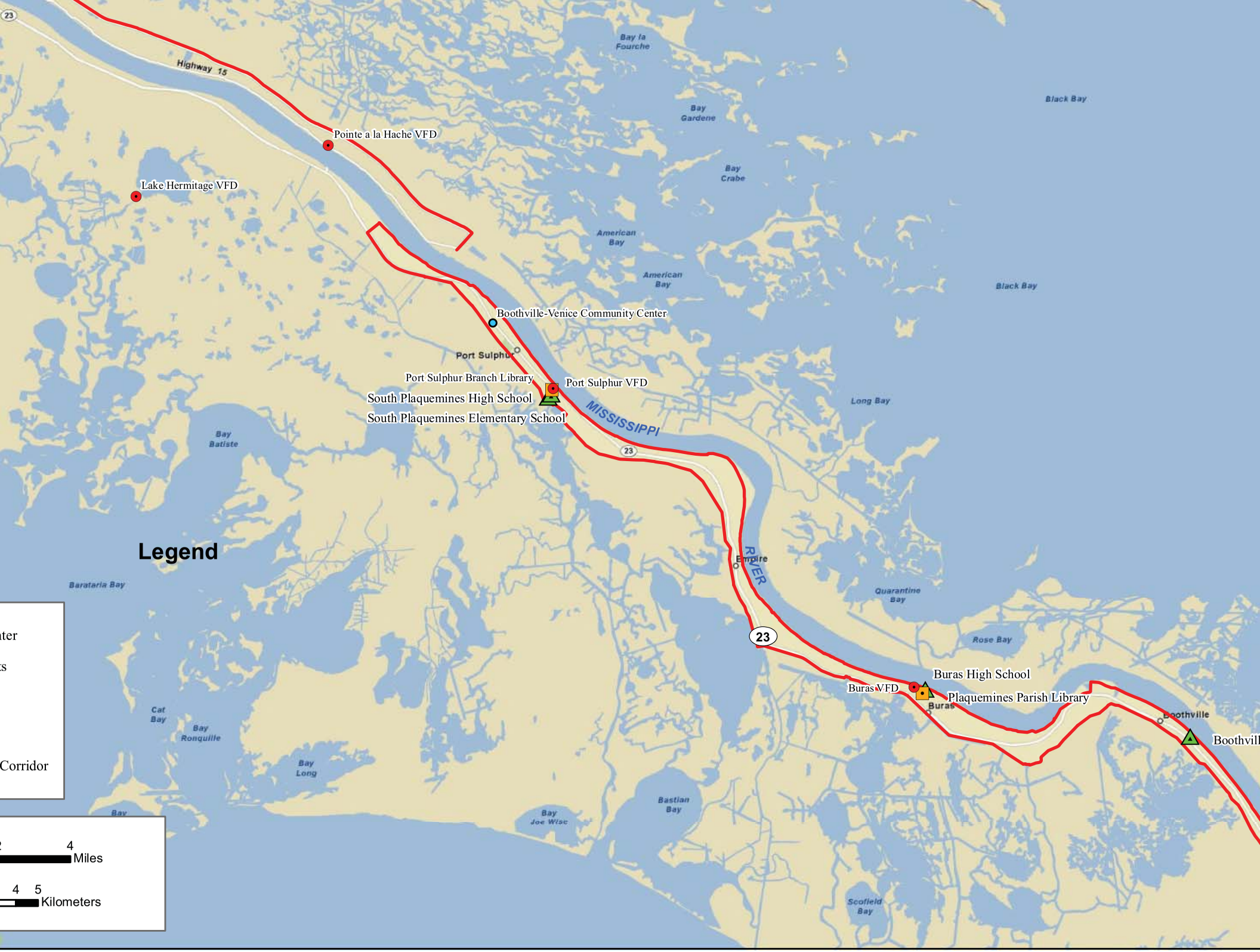
Highway 15
Pointe a la Hache VFD
Lake Hermitage VFD
Bay la Fourche
Bay Gardene
Bay Crabe
Black Bay
American Bay
American Bay
Black Bay
Boothville-Venice Community Center
Port Sulphur
Port Sulphur Branch Library
Port Sulphur VFD
South Plaquemines High School
South Plaquemines Elementary School
MISSISSIPPI
RIVER
Long Bay
Bay Batiste
Legend
Barataria Bay
Empire
Quarantine Bay
Rose Bay
23
Buras High School
Buras VFD
Plaquemines Parish Library
Buras
Boothville
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Cat Bay
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old Buras High School (PPG 2010b). In September 2010, construction of the next South Plaquemines High School began. The new school will be located at the site of the old Buras Middle School, south of Empire, and is expected to house students for the 2012-2013 school year (McCormack 2010a). The school will be elevated to approximately 20 ft to protect it against flooding.

5.305 South Plaquemines Elementary and South Plaquemines High School are located in Port Sulphur, adjacent to NOV 06 and NOV 10. Attendance at the schools for the 2009 school year was 262 and 365 children, respectively (PPG 2010b).

5.306 The current Phoenix High School is located in the vicinity of NOV 01 and 191 students were enrolled in 2009 (PPG 2010b). Mass-produced temporary buildings have been used since Hurricane Katrina hit the parish. The new Phoenix High School will also be located in the vicinity of NOV 01. Plaquemines Parish School Board broke ground on the new permanent school building in early November 2010 (Sercovich 2010c). The newly constructed Phoenix High School will cost $27 million and house 500 students, and is expected to be completed in 2012.

Health Care

5.307 Health care in Plaquemines Parish was devastated by the 2005 and 2008 hurricanes. Plaquemines Medical Center, in temporary buildings in Port Sulphur, provides vital medical services in the project area. FEMA and the Louisiana Recovery Authority announced $13.5 million in consolidated funding for the construction of a new three-story facility (FEMA 2009).

5.308 Since 2008, access to medical care for children has improved, in the way of a Crisis Health Unit bus from the Children's Health Fund (McCormack 2010b). The bus was brought to the region following the explosion of the oil rig (related to the BP Deepwater Horizon oil spill) in the Gulf in April of 2010. The bus is currently stationed in Port Sulphur and patients are seen on Fridays. As requests for appointments increase, additional appointment days will be added, as will locations in the region.

POPULATION

5.309 Census data for population were available at the parish and state level for the year 2000 and estimates are available for 2010 (ESRI 2010) (Table 5-17). According to 2010 estimates, Plaquemines Parish lost 6.17% of its residents since the year 2000, while the state of Louisiana saw a slight increase in population. Data were also available for Census Block Groups (Table 5-18).

Table 5-17. Year 2000 Data and 2008 and 2010 Population Estimates for Plaquemines Parish and the State of Louisiana

	2000	2010	Percent Change
Plaquemines Parish	26,757	25,106	-6.17
Louisiana	4,468,976	4,507,335	0.86

U.S. Census Bureau 2000a, 2000b and ESRI 2010.

Table 5-18. Year 2000 Data and 2008 and 2010 Population Estimates for Census Block Groups in the NOV Project Area

Segment	Census Tract and Block Group	2000 Population	2010 Population Estimate	Percent Change
NOV 01	501.3	1,812	1,527	-15.7
NOV 02	501.3	1,812	1,527	-15.7
NOV 05	504.1	1,145	1,056	-7.8
NOV 06	505.1	776	600	-22.7
	505.2	1,049	668	-36.3
	505.3	780	483	-38.1
	506.1	1,484	578	-61.1
	506.3	4	0	-100.0
NOV 07	506.1	1,484	578	-61.1
	506.2	727	383	-47.3
	507.1	697	370	-46.9
	507.2	751	738	-1.7
	507.3	1,202	1,178	-2.0
	507.4	708	542	-23.4
NOV 08	507.4	708	542	-23.4
	508.1	58	53	-8.6
	508.2	1,521	811	-46.7
	508.3	699	386	-44.8
NOV 09	504.1	1,145	1,056	-7.8
NOV 10	505.1	776	600	-22.7
	505.2	1,049	668	-36.3
	505.3	780	483	-38.1
	506.1	1,484	578	-61.1
NOV 11	507.2	751	738	-1.7
NOV 12	507.3	1,202	1,178	-2.0
	507.4	708	542	-23.4
	508.2	1,521	811	-46.7
	508.3	699	386	-44.8
NOV 13	506.3	727	383	-47.3
NOV 14	506.1	1,484	578	-61.1
	506.2	727	383	-47.3
NOV 15	505.1	776	600	-22.7
	507.4	708	542	-23.4
	508.1	58	53	-8.6
	508.3	699	386	-44.8
NOV 16	506.1	1,484	578	-61.1
	506.2	727	383	-47.3
	507.1	697	370	-46.9
	507.2	751	738	-1.7

Source: ESRI 2010 and U.S. Census Bureau 2000a

COMMUNITY AND REGIONAL GROWTH

5.310 Generally, desirable community and regional growth is considered to be growth supported by local and regional institutions through economic developments, social programs, and the human environment, including water resource development supported by neighborhoods and metropolitan areas as reflected by employment, income, and population trends. While total employment and population within the NOV project area have tended to decline in recent decades, redevelopment efforts are changing this and new industries and jobs are being actively pursued by the local government. As previously mentioned, the effects of Hurricane Katrina have included severe damage to communities within the NOV project area, and a larger region extending for about 200 miles along the Gulf coast. Estimates are that Hurricanes Katrina and Rita caused the destruction of 200,000 housing units and 18,000 businesses, many of which have not been restored, influencing community and regional growth.

HOUSING AND DISPLACEMENT OF PEOPLE

5.311 Following Hurricanes Katrina, Rita, Gustav, and Ike, many people lost their homes in the vicinity of the project corridor, and have not rebuilt; however, some persons have placed mobile homes on their property.

5.312 Census 2000 data indicate between 11 and 27% vacancy in the project area (Table 5-19). However, some block groups had a higher rate of vacancy, ranging from 41 to 95% (see Block Groups 504.1, 506.3, and 508.1). Additionally, most of the non-vacant homes were owner-occupied in 2000. Between 77 and 100% of the occupied homes in the project area, in 2000, were owner-occupied. However, those census block groups where 100% of the occupied homes were owner-occupied only consisted of a few houses (see Census Block Groups 506.3 and 508.1 in Table 5-19).

5.313 Estimated 2010 housing data for the project area were available from ESRI (2010). Each block group in segments NOV 01, NOV 02, NOV 05, and NOV 13 experienced an increase in total housing units between 2000 and 2010. Housing units in block groups in the NOV 06 project area decreased between 3 and 23%, with the exception of block group 506.3, which had almost a 50% increase in housing units between 2000 and 2010 (see Table 5-19). The remaining NOV levee sections saw a mix in decline in the number of housing units and an increase in the number of housing units. Block group 508.1 in section NOV 15 had the greatest increase in housing units between 2000 and 2010 (51.4%).

5.314 Current estimates indicate that vacancy rates in the project area are between 17 and 100% (see Table 5-19). The number of vacant homes in all block groups in the project area increased between 2000 and 2010. None of the 61 housing units in block group 506.3 are occupied (ESRI 2010, see Table 5-19).

5.315 As in 2000, most of the non-vacant housing units in the project area are owner-occupied (see Table 5-19). Between 81 and 100% of the occupied homes in the project area were occupied by their owners in 2010.

Table 5-19. Housing Data for the Project Area

Segment	Census Tract and Block Group	2000			2010*			Percent Change in Total Housing Units From 2000 to 2010
		Total Housing Units	Percent Vacant	Percent Owner-occupied	Total Housing Units	Percent Vacant	Percent Owner-occupied	
NOV 01	501.3	520	11.0	88.8	532	17.7	90.0	2.3
NOV 02	501.3	520	11.0	88.8	532	17.7	90.0	2.3
NOV 05	504.1	677	41.2	89.9	960	59.1	90.8	41.8
NOV 06	505.1	281	11.0	86.4	270	24.1	87.8	-3.9
	505.2	419	15.3	82.5	384	36.2	84.9	-8.4
	505.3	341	16.7	83.1	315	39.4	85.3	-7.6
	506.1	625	16.2	88.2	481	54.3	89.5	-23.0
	506.3	41	95.1	100.0	61	100.0	0	48.8
NOV 07	506.1	625	16.2	88.2	481	54.3	89.5	-23.0
	506.2	298	17.1	82.6	272	48.2	85.8	-8.7
	507.1	306	14.7	77.0	273	45.4	81.2	-10.8
	507.2	333	26.4	78.0	402	36.3	81.6	20.7
	507.3	459	12.6	83.5	549	23.7	85.9	19.6
	507.4	310	22.9	78.7	342	43.6	82.4	10.3
NOV 08	507.4	310	22.9	78.7	342	43.6	82.4	10.3
	508.1	72	72.2	100.0	109	81.7	100.0	51.4
	508.2	615	18.7	85.4	570	49.5	87.5	-7.3
	508.3	318	22.6	90.7	287	48.4	90.5	-9.7
NOV 09	504.1	677	41.2	89.9	960	59.1	90.8	41.8
NOV 10	505.1	281	11.0	86.4	270	24.1	87.8	-3.9
	505.2	419	15.3	82.5	384	36.2	84.9	-8.4
	505.3	341	16.7	83.1	315	39.4	85.3	-7.6
	506.1	625	16.2	88.2	481	54.3	89.5	-23.0
NOV 11	507.2	333	26.4	78.0	402	36.3	81.6	20.7
NOV 12	507.3	459	12.6	83.5	549	23.7	85.9	19.6
	507.4	310	22.9	78.7	342	43.6	82.4	10.3
	508.2	615	18.7	85.4	570	49.5	87.5	-7.3
	508.3	318	22.6	90.7	287	48.4	90.5	-9.7
NOV 13	506.3	41	95.1	100.0	61	100.0	0	48.8
NOV 14	506.1	625	16.2	88.2	481	54.3	89.5	-23.0
	506.2	298	17.1	82.6	272	48.2	85.8	-8.7
NOV 15	505.1	281	11.0	86.4	270	24.1	87.8	-3.9
	507.4	310	22.9	78.7	342	43.6	82.4	10.3
	508.1	72	72.2	100.0	109	81.7	100.0	51.4
	508.3	318	22.6	90.7	287	48.4	90.5	-9.7
NOV 16	506.1	625	16.2	88.2	481	54.3	89.5	-23.0
	506.2	298	17.1	82.6	272	48.2	85.8	-8.7
	507.1	306	14.7	77.0	273	45.4	81.2	-10.8
	507.2	333	26.4	78.0	402	36.3	81.6	20.7

Source: U.S. Census Bureau 2000c, ESRI 2010.
* 2010 data are estimates

5.316 United Way is conducting a survey of housing needs in Plaquemines Parish on the Eastbank (Sercovich 2010b). A $6.7 million state grant was received to assist new private home owners with buying a home near newly opened community centers (see Public/Community Services).

COMMUNITY COHESION

5.317 Community cohesion is the unifying force of conditions that provide commonality within a group. It has also been used to describe patterns of social networking within a community. Community cohesion refers to the common vision and sense of belonging within a community that is created and sustained by the extensive development of individual relationships that are social, economic, cultural, and historical in nature. The degree to which these relationships are facilitated and made effective is contingent upon the spatial configuration of the community itself; the functionality of the community owes much to the physical landscape within which it is set. The viability of community cohesion is compromised to the extent to which these physical features are exposed to interference from outside sources.

ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

5.318 Approximately 30% of Plaquemines Parish described themselves as a minority in 2000, compared to the approximately 36% of Louisiana (Table 5-20). Estimates for 2010 indicate similar percentages in the parish and state. Data at the Census Block Group level (Table 5-21) were used for the Environmental Justice and Protection of Children analyses.

NOV 01 and NOV 02

5.319 NOV 01 and NOV 02 are located within Census Block Group 501.3 which stretches from Parish Hwy 15 to the MRL. According to Census 2000 data, this area was a minority, low-income community in 2000, with 85% of the population a minority and 47% of the population low-income (see Table 5-21). These percentages are substantially higher than state or parish figures (see Table 5-20). ESRI estimates for 2010 indicate a slightly higher percentage of minorities in the block group. Although data are not available at this time, it can be assumed that a similar percentage of the population of the block group is living below the poverty level.

Table 5-20. Population, Minority Population, and Low Income Population Data for Plaquemines Parish and the State of Louisiana

Location	2000			2010	
	Total Population	Percent Minority	Percent Low Income	Total Population	Percent Minority
Plaquemines Parish	26,757	30.2	18.0	25,106	31.4
Louisiana	4,468,976	36.1	19.6	4,507,335	36.5

U.S. Census Bureau 2000a, 2000b and ESRI 2010.

Table 5-21. Population, Minority Population and Low Income Population Data for Census Block Groups in the Project Area

Segment	Census Tract and Block Group	2000			2010	
		Total Population	Percent Minority	Percent Low Income*	Total Population	Percent Minority
NOV 01	501.3	1,812	85.0	47.1	1,527	87.2
NOV 02	501.3	1,812	85.0	47.1	1,527	87.2
NOV 05	504.1	1,145	73.0	31.1	1,056	78.2
NOV 06	505.1	776	45.2	6.1	600	52.7
	505.2	1,049	55.6	12.5	668	62.0
	505.3	780	41.2	9	483	48.4
	506.1	1,484	28.9	49.5	578	35.3
	506.3	4	0	0	0	0
NOV 07	506.1	1,484	28.9	25.9	578	35.3
	506.2	727	60.2	31.7	383	66.6
	507.1	697	35.0	15.7	370	42.4
	507.2	751	38.9	22.2	738	47.2
	507.3	1,202	20.3	19.3	1,178	25.6
	507.4	708	24.2	25.5	542	29.7
NOV 08	507.4	708	24.2	25.5	542	29.7
	508.1	58	19.0	79.2	53	22.6
	508.2	1,521	47.9	16.8	811	55.1
	508.3	699	16.7	19.3	386	22.3
NOV 09	504.1	1,145	73.0	31.1	1,056	78.2
NOV 10	505.1	776	45.2	6.1	600	52.7
	505.2	1,049	55.6	12.5	668	62.0
	505.3	780	51.2	49.5	483	48.4
	506.1	1,484	28.9	25.9	578	35.3
NOV 11	507.2	751	38.9	22.2	738	47.2
NOV 12	507.3	1,202	20.3	19.3	1,178	25.6
	507.4	708	24.2	25.5	542	29.7
	508.2	1,521	47.9	16.8	811	55.1
	508.3	699	16.7	19.3	386	22.3
NOV 13	506.3	727	0	0	383	0
NOV 14	506.1	1,484	28.9	25.9	578	35.3
	506.2	727	60.2	31.7	383	66.6
NOV 15	505.1	776	45.2	6.1	600	52.7
	507.4	708	24.2	25.5	542	29.7
	508.1	58	19.0	79.2	53	22.6
	508.3	699	16.7	19.3	386	22.3
NOV 16	506.1	1,484	28.9	25.9	578	35.3
	506.2	727	60.2	31.7	383	66.6
	507.1	697	35.0	15.7	370	42.4
	507.2	751	38.9	22.2	738	47.2

*Individuals below poverty level and Census Block Group level data are based on a Census 2000 sample.
Data are estimates of the actual figures.
N/A – not applicable
No data – data are not available at the census block group level.

NOV 05 and NOV 09

5.320 NOV 05 and NOV 09 are located within Block Group 504.1 which stretches from LA 23 to the Levee Road. According to Census 2000 data, this area was a minority, low-income community in 2000, with 73% of the population a minority and approximately 31% of the population low-income (see Table 5-21). These percentages are substantially higher than state or parish figures (see Table 5-20). ESRI estimates for 2010 indicate a slightly higher percentage of minorities in the block group. Although data are not available at this time, it can be assumed that a similar percentage of the population of the block group is living below the poverty level.

NOV 06 and NOV 10

5.321 NOV 06 is located within Block Groups 505.1, 505.2, 505.3, 506.1, and 506.3 which stretch from the back levee to the Mississippi River Levee Road. NOV 10 is located in all the same block groups as in NOV 06, with the exception of 506.3. According to Census 2000 data, most of this area was a minority, low-income community in 2000, except block group 506.3 (see Table 5-21). Data estimates for 2010 indicate the block groups still have a significant minority population.

5.322 When compared to state or parish figures, the percent minority for block groups 505.1, 505.2 and 505.3 are higher than state or parish figures (see Table 5-20) and the percent low-income for all the block groups in NOV 06 and 10 are substantially higher than parish or state figures. Block group 506.3 had a lower number of minority persons than the state or parish, in 2010. Overall, it may be assumed that the percent of the population living below the poverty level is similar to the 2000 values; therefore, it can be assumed that this area is still likely an environmental justice area.

NOV 07 and NOV 11

5.323 NOV 07 spans 6 Census Block Groups – 506.1, 506.2, 507.1, 507.2, 507.3, and 507.4 which stretch from the back levee to the Mississippi River Levee Road. NOV 11 is located in Census Block Group 507.2 only. Each of the block groups in reaches NOV 07 and NOV 11 has a high minority and low-income population in 2000 and a high minority population in 2010 (see Table 5-21). Several of the block groups in the area have a higher percentage of minority persons than the percentage for the state and/or the nation. Block Groups 507.3 and 507.4 had less minority persons than the state or the parish in 2000 and 2010 (see Table 5-20). Although data for 2010 are not available for low-income individuals in the project area, it may be assumed that the percent of the population living below the poverty level is similar to the 2000 values; therefore, it can be assumed that this area is still likely an area subject to disproportionate effects on minorities and low-income persons.

NOV 08 and NOV 12

5.324 NOV 08 spans four Census Block Groups – 507.4, 508.1, 508.2, and 508.3. The NOV 12 segment is located in Census Block Groups 507.3, 507.4, 508.2, and 508.3. These block groups comprise the back levee to the Mississippi River Levee Road.

5.325 In the 2000 Census, most of the block groups in these reaches had a high minority and low-income population (U.S. Census Bureau 2000; Table 5-21). The only census block group with a greater percentage of minority persons than at the state or parish level was 508.2 (see

Table 5-20). In 2000, all of the Census block groups in NOV 08 and NOV 11 had a substantially higher percentage of low-income persons than at the state or parish level. ESRI estimates for 2010 indicate similar percentages of minority persons in the NOV 08 and NOV 12 project areas.

5.326 Although ESRI estimates for 2010 are not available for low-income individuals in the project area, it may be assumed that the percent of the population living below the poverty level is similar to the 2000 values; therefore, it can be assumed that this area is still likely an area subject to disproportionate effects on minorities and low-income persons.

NOV 11

5.327 NOV 11 is located within Block Group 507.2 which stretches from the back levee to the Levee Road. This area was a minority, low-income community in 2000, with 38.9% of the population a minority and approximately 22.2% of the population low-income (Table 5-21). The 2000 minority and low-income population percentage was higher than the state or parish (see Table 5-20). ESRI estimates for 2010 indicate a higher percentage of minorities live in block group 507.2. In 2000, approximately 22 percent of the population was low-income. Block Group 507.2 is likely to still be an area subject to disproportionate effects on minorities and low-income persons.

NOV 13

5.328 NOV 13 is located within Block Group 506.32 which stretches from the back levee to the Mississippi River Levee Road. Data for 2000 and estimates for 2010 show that no minority or low- income persons live in the area. Therefore, it is not likely that this area is an area subject to disproportionate effects on minorities and low-income persons.

NOV 14 and NOV 16

5.329 NOV 14 is located in Census Block Groups 506.1 and 506.2 and NOV 16 is located in Census Block Groups: 506.1, 506.2, 507.1, and 507.2 which stretch from the back levee to the Mississippi River Levee Road. Each of the block groups in these reaches had a high minority population in 2000 and 2010 (Table 5-21). Census 2000 data indicate the area was also a low-income area. Although low-income estimates or data are not available for the area, it is likely that this area is still an area subject to disproportionate effects on minorities and low-income persons.

NOV 15

5.330 NOV 15 is located in Census Block Groups: 505.1, 507.4, 508.1, and 508.3 which stretch from the back levee to the Mississippi River Levee Road. Each of the block groups in these sections had a high minority population in 2000 and estimates indicate the same for 2010 (Table 5-21). Although more recent low-income estimates or data are not available, it is likely that this area is still an area subject to disproportionate effects on minorities and low-income persons.

SECTION 6.
ENVIRONMENTAL CONSEQUENCES

6. ENVIRONMENTAL CONSEQUENCES

6.1 This section describes the expected beneficial and adverse effects of each alternative on the previously discussed significant resources and serves as the source of information for Table 4-1, Comparative Impacts of Alternatives, presented previously in Section 4. Wherever possible, quantitative impacts have been assessed.

6.2 As discussed in Section 4, borrow material would be required for the NOV levee project. Before borrow material can be used for levee construction, soil borings, testing, and environmental clearance of potential borrow sites needs to be completed. Borrow material is normally acquired by the government from a landowner through a real estate acquisition. However, alternative methods of securing borrow can be utilized when found to be in the best interest of government for a particular contract, based on a detailed borrow analysis. If the borrow analysis determines that acquiring CF borrow is in the best interest of the government, then CF borrow would be considered. The NEPA coordination for some potential borrow sources has been previously documented under several IERs. Potential GF borrow areas were coordinated with IERs 18, 22, 25, and 28, while IERs 19, 23, 26, 29, 30, 31, and 32 coordinated with certain pre-approved CF borrow areas; however, a contractor may opt to use an alternative borrow source not listed in these IERs. All borrow IERs are posted on www.nolaenvironmental.gov.

6.3 For analysis purposes, the findings of the IERs for the GF and CF borrow areas are discussed in this section following levee alternative analysis. While contractors may use borrow from an approved CF borrow site as discussed in the IERs, the possibility also exists that a contractor may use an alternative borrow source for which the environmental consequence have not yet be assessed. Prior to any borrow acquisition, the USACE would review the existing environmental documentation to ascertain if additional impact analysis or agency coordination would be necessary. If so, the USACE would produce the appropriate NEPA documentation for that particular borrow area.

6.4 An impact (consequence or effect) is defined as a modification to the human or natural environment that would result from the implementation of an action. The impacts can be either beneficial or adverse, and can be either directly related to the action or indirectly caused by the action (secondary, indirect, or synergistic effects). The effects can be temporary (short-term), long lasting (long-term), or permanent. For purposes of this SEIS, temporary (short-term) effects are defined as those that would last up to 3 years after completion of the action. Long-term impacts are defined as those that would last 3 to 20 years. Permanent impacts would require an irretrievable commitment of resources.

6.5 Impacts can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. The significance of the impacts presented in this SEIS is based upon existing regulatory standards, scientific and environmental knowledge, and/or best professional opinions of the authors of the SEIS. The significance of the impacts on each resource will be described as significant, moderate, minimal, insignificant (or negligible), or no impact.

Significant impacts are those effects that would result in substantial changes to the environment and should receive the greatest attention in the decision-making process.

Significant Resources

GEOLOGY AND SOILS

Alternative 1: No Action Alternative

6.6 Under Alternative 1 (No Action), no restoration, armoring, or accelerated completion of existing NOV Federal flood risk reduction infrastructure within Plaquemines Parish would be implemented. The existing NOV levees would not be restored structurally and flood risk reduction would not be provided within these levee sections. As a result of Alternative 1, no impacts on geology or soils within the project corridor would occur. Levees would continue to be at risk and could further degrade, since subsidence would occur.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.7 Within the project area, there are no special or unique geologic deposits, and accelerated completion or restoration of the existing levees would not impact the geology of the area. Continued subsidence of the flood risk reduction levees and the protected areas between the levees would be expected to continue as it has in the past. Attention would be given to the projected trend of the Bastian Bay fault system where it would cross the hurricane risk reduction system levees. The projected trend of the fault system would place it intersecting NOV 7 and NOV 16, with possible impacts on NOV 14 at the Empire Lock Floodwall. Future movement on this fault system could cause a shift in the levee crest with a resulting change in risk reduction status. Negligible or no impacts on geology or geologic features would result directly from the construction of the TSP; therefore, no further analysis of geological features within individual project levee sections will be carried forward in this SEIS. Potential future movement on the Bastian Bay fault system could significantly impact the TSP in the sections described above.

6.8 Soils impacted by the project are relatively abundant in the general area, particularly the soils within the proposed expanded ROW for the levee and staging areas, and loss of these common soils would not have a significant effect on the availability of other similar soils in the area.

6.9 Expansion of the existing levee footprint in some areas would not be expected to adversely impact prime farmland. The prime farmland soils directly adjacent to the levees are not currently in crop production and are not suitable for crop production due to their location adjacent to the toe of the existing levee and their separation from productive farmlands by roads and ditches. A Farmland Conversion Impact Rating form (NRCS-CPA-106) will be submitted to the NRCS for consideration. Consultation is ongoing and findings will be incorporated into the Final SEIS.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.10 Alternative 3 would result in impacts on geology and soils similar to those described for Alternative 2. There would be negligible to no impacts on geology. Similar to Alternative 2, soils and prime farmland would not be significantly impacted.

WETLAND RESOURCES

Alternative 1: No Action Alternative

6.11 Under Alternative 1 (No Action), no restoration, armoring, or accelerated completion of existing Federal flood risk reduction infrastructure within Plaquemines Parish would be implemented. The existing NOV levees would not be restored structurally and flood risk reduction would not be provided within these levee sections. As a result of Alternative 1, no impacts on wetlands within the project corridor would occur.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.12 Implementation of the TSP would have varying impacts on WUS, including wetlands and other waters. Impacts resulting from the construction of proposed NOV levee sections would require coordination and 404(b)(1) analysis from CEMVK and Section 401 authorization from LDEQ, once the TSP is ultimately selected. CEMVK would follow project evaluation guidelines set forth in Section 404(b)(1) of the CWA, which requires CEMVK to evaluate and assess the short- and long-term impacts associated with the discharge of dredged and fill materials into WUS resulting from this project. The justification and mitigation for all impacts on WUS, including wetlands and other waters, involves first trying to avoid impacts on the resource, secondly minimizing impacts on the resource, and thirdly providing compensatory mitigation for all unavoidable impacts on WUS, including wetlands and other waters. Avoidance is determined first by demonstrating that the proposed project is water dependent, and secondly by demonstrating that the proposed project is the least environmentally damaging practicable alternative. Since the purpose and need is to develop an effective risk reduction levee in Plaquemines Parish, Louisiana, impacts on WUS, other waters, and wetlands would be unavoidable.

6.13 NOV project actions would have direct, long-term, significant impacts on WUS, including wetlands and other waters as identified by the USACE. Table 6-1 provides a comprehensive summary of the WUS, including wetlands and other waters to be impacted as a result of each action alternative for each NOV levee section. The acreages denoted are based on the wetland delineation conducted during 2008 and through aerial photography interpretation.

6.14 If implemented, Alternative 2 would result in permanent impacts on approximately 146.6 acres of WUS, 366.5 acres of jurisdictional wetlands, and 11 acres of other waters (Table 6-1). These impacts would occur as a result of the dredge and fill activities necessary to complete Alternative 2. Impacts would be mitigated through a compensatory mitigation plan located in Appendix F . Section 401 water quality certification and Section 404(b)(1) analysis would be completed and obtained prior to construction of the risk reduction levees.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.15 If implemented, Alternative 3 would result in permanent impacts on approximately 506 acres of WUS, 1,161 acres of wetlands, and 43 acres of other waters (See Table 6-1). These impacts would occur as a result of the dredge and fill activities necessary to complete Alternative 3. Impacts would be mitigated through a compensatory mitigation plan located in Appendix F. Section 401 water quality certification and Section 404(b)(1) analysis would be completed and obtained prior to construction of the risk reduction levees.

Table 6-1. Impacts by NOV Levee Section on the Waters of the U.S., including Wetlands and Other Waters

NOV Levee Section	Type	Acres Impacted	
		Alternative 2 (TSP)	Alternative 3
NOV 01	Wetland	102.13	122.78
	WUS	1.85	134.80
NOV 02	Wetland	0.12	0.29
	WUS	0.41	1.28
NOV 05	Wetland	26.33	54.61
	WUS	1.89	8.60
NOV 06	Wetland	23.46	72.41
	WUS	116.68	62.73
	Other waters	5.81	0.30
NOV 07	Wetland	26.01	295.96
	WUS	0.63	54.37
NOV 08	Wetland	26.51	169.08
	WUS	0.00	34.40
NOV 09	Wetland	40.97	69.23
	WUS	3.39	13.48
NOV 10	Wetland	26.27	105.84
	WUS	0.30	54.51
	Other waters	0.00	2.97
NOV 11	Wetland	17.83	78.87
	WUS	2.08	37.61
	Other waters	0.00	2.23
NOV 12	Wetland	44.34	99.77
	WUS	13.19	37.84
	Other waters	5.06	37.45
NOV 13	Wetland	0.09	1.09
	WUS	0.69	7.23
NOV 14	Wetland	0.24	0.24
	WUS	0.66	1.28
NOV 15	Wetland	4.04	13.19
	WUS	2.88	21.70
NOV 16	Wetland	28.17	77.67
	WUS	1.97	36.09
TOTAL	**Wetland**	**366.50**	**1,161.03**
	WUS	**146.62**	**505.92**
	Other waters	**10.87**	**42.95**

Wetland Value Assessment

6.16 Impacts on wetland habitats from construction of the NOV levee system were analyzed using Wetland Value Assessment (WVA) methodology (Appendix F). The WVA methodology is a quantitative, habitat-based assessment tool developed for use in determining wetland benefits of proposed projects submitted for funding under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA); however, the methodology is widely used to evaluate the impacts of coastal projects on wetland values. The results of the WVA provide a quantitative estimate of the positive or negative environmental effects of a potential project measured in average annual habitat units (AAHU). Typically, for a USACE civil works project, the WVA is applied to the habitats that will be impacted by the project. The WVA is applied to potential mitigation plans to develop appropriate compensatory mitigation if net negative impacts are determined. The minimization of impacts in conjunction with compensatory mitigation has been planned as a result of Proposed Action. This mitigation plan is located in Appendix F.

6.17 The WVA has been developed for application to several habitat types along the Louisiana coast including fresh/intermediate marsh, brackish marsh, saline marsh, fresh swamp, barrier islands, and barrier headlands. A WVA Procedural Manual has also been prepared to provide guidance to project planners in the use of the various community models (Environmental Working Group 2006). Two other habitat assessment models for BLH and coastal chenier/ridge habitat were developed for use outside of CWPPRA.

6.18 Habitat quality is estimated through the use of community models developed specifically for each habitat type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index (SI) graph for each variable, which defines the assumed relationship between habitat quality and different variable values, and 3) a mathematical formula that combines the SI for each variable into a single value for habitat quality; that single value is referred to as the Habitat Suitability Index (HSI) (Environmental Working Group 2006).

6.19 An SI function describes the relationship between a measurable condition and fish and wildlife habitat quality or 'suitability,' and can be used to predict habitat quality based on the value of the measured condition. This allows the model user to evaluate, through the SI, the quality of a habitat for any variable value. Each SI ranges from 0.1 to 1.0, with 1.0 representing the optimal condition for the variable in question. SI graphs are developed for each variable based on empirical data and observed relationships (Environmental Working Group 2006, Environmental Working Group 2009, LDNR 1994). The final step in model development is to construct a mathematical formula that combines all SIs into a single HSI value. The HSI values are a numerical representation of the overall or "composite" habitat quality of the particular habitat being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each habitat type depending on how the formula is constructed (Environmental Working Group 2006).

6.20 CEMVK's analyses indicated that the implementation of the TSP would result in impacts of 409.52 habitat acres and the implementation of Alternative 3 would result in impacts of 1,544 habitat acres (Table 6-2). The impacted WUS acreage numbers will differ from the WVA acreage estimates because the WVAs only analyzed habitats requiring mitigation. Open water

canals and ditches on the protected side of the levee, spoil banks, and open fields which are included in the WUS and wetland acreages were not included in the WVA analysis because they would not require mitigation. In addition, only wet BLH habitat would be considered for mitigation (Environmental Laboratory 1987).

6.21 The net impacts of a proposed project are estimated by predicting future habitat conditions under two scenarios: future without-project (FWOP) and future with-project (FWP). Specifically, predictions are made as to how the model variables would change through time under the two scenarios. Through that process, HSIs are established for baseline (pre-project) conditions and for FWOP and FWP scenarios for selected target years (TY) throughout the expected life of the project. HSIs are then multiplied by the project area acreage at each TY to arrive at Habitat Units (HUs). HUs represent a numerical combination of quality (HSI) and quantity (acres) existing at any given point in time. The HUs are then averaged over the project life, to determine AAHUs. The impact of a project can be quantified by comparing AAHUs between the FWOP and FWP scenarios. The difference in AAHUs between the two scenarios represents the net impact attributable to the project in terms of habitat quantity and quality (Environmental Working Group 2006). The same type of analysis is applied to proposed mitigation plans to develop appropriate compensatory mitigation for unavoidable project impacts.

6.22 WVAs were performed for each of the Alternative 2 and 3 actions. The assessment determined that fresh marsh, intermediate marsh, brackish marsh, saline marsh, scrub-shrub, altered BLH, and wet BLH in the batture habitat along the Mississippi River would be impacted by expansion of the levee footprint. Construction of the flood risk reduction levee would result in the loss of these habitats. The WVA analyses indicated that the implementation of the TSP would result in the direct loss of 223.33 AAHUs and the implementation of Alternative 3 would result in the direct loss of 735.93 AAHUs (Table 6-3).

FLOODPLAIN MANAGEMENT

Alternative 1: No Action Alternative

6.23 Under Alternative 1 (No Action), no restoration, armoring, or accelerated completion of existing NOV Federal flood risk reduction infrastructure within Plaquemines Parish would be implemented. The existing levees would not be restored structurally and flood risk reduction would not be provided within these levee sections. As a result, Alternative 1 would have no impacts on floodplains within the project corridor.

Table 6-2. Summary of Impacts (acreages) for Alternatives 2 and 3 by Levee Section and Habitat

Alternative	NOV Section	BLH (altered)	Scrub-Shrub	Batture		Intermediate Marsh	Wet Pasture	Brackish Marsh	Saline Marsh	TOTALS BY SECTION (Acres)
				Wet BLH	Fresh Marsh					
Alternative 2 (TSP): 50-year level of risk reduction	NOV 01	1.86	-	-	-	75.26	-	30.00	-	**107.12**
	NOV 05	-	2.96		-	-	-	-	21.89	**24.85**
	NOV 06	-	-	-	-	-	-	-	25.04	**25.04**
	NOV 07	-	-	-	-	-	-	-	22.14	**22.14**
	NOV 08	-	-	-	-	-	-	-	36.92	**36.92**
	NOV 09	-	-	40.60	-	-	-	-	-	**40.6**
	NOV 10	-	-	30.08	-	-	-	-	-	**30.08**
	NOV 11	-	-	9.79	20.40	-	-	-	-	**30.19**
	NOV 12	-	-	15.04	31.35	-	-	-	-	**46.39**
	NOV 15	-	-	5.76	12.00	-	-	-	-	**17.76**
	NOV 16	-	-	9.22	19.21	-	-	-	-	**28.43**
Alternative 3: Pre-Katrina (GDM) level of risk reduction	NOV 01	22.10				128.62		40.01		**190.73**
	NOV 05		7.46						56.22	**63.68**
	NOV 06								109.61	**109.61**
	NOV 07	22.91					103.59		128.76	**255.26**
	NOV 08		50.19						208.48	**258.67**
	NOV 09			76.27						**76.27**
	NOV 10			276.72						**276.72**
	NOV 11			33.26	69.32					**102.58**
	NOV 12			37.03	77.20					**114.23**
	NOV 15			5.67	11.81					**17.48**
	NOV 16			25.54	53.23					**78.77**
TOTALS										**TOTALS BY ALTERNATIVE**
Alternative 2 (TSP)		**1.86**	**2.96**	**110.49**	**82.96**	**75.26**	**0**	**30**	**105.99**	**409.52**
Alternative 3		**45.01**	**57.65**	**454.49**	**211.56**	**128.62**	**103.59**	**40.01**	**503.07**	**1544.00**

Table 6-3. Summary of Impacts (AAHUs) for Alternatives 2 and 3 by Levee Section and Habitat

Alternative	NOV Section	BLH (altered)	Scrub-Shrub	Batture		Intermediate Marsh	Wet Pasture	Brackish Marsh	Saline Marsh	TOTALS BY SECTION
				Wet BLH	Fresh Marsh					
Alternative 2 (TSP): 50-year level of risk reduction	NOV 01	-1.18	-	-	-	-37.37	-	-20.67	-	**-59.22**
	NOV 05	-	-1.33	-	-		-	-	-14.51	**-15.84**
	NOV 06	-	-	-	-	-	-	-	-13.58	**-13.58**
	NOV 07	-	-	-	-	-	-	-	-14.70	**-14.70**
	NOV 08	-	-	-	-	-	-	-	-33.42	**-33.42**
	NOV 09	-	-	-24.85	-	-	-	-	-	**-24.85**
	NOV 10	-	-	-18.41	-	-	-	-	-	**-18.41**
	NOV 11	-	-	-5.99	-5.24	-	-	-	-	**-11.23**
	NOV 12	-	-	-9.21	-6.87	-	-	-	-	**-16.08**
	NOV 15	-	-	-3.53	-2.63	-	-	-	-	**-6.16**
	NOV 16	-	-	-5.64	-4.21	-	-	-	-	**-9.85**
Alternative 3: Pre-Katrina (GDM) level of risk reduction	NOV 01	-14.01	-	-	-	-40.86	-	27.57	-	**-27.30**
	NOV 05	-	-3.36	-	-	-	-	-	-32.74	**-36.10**
	NOV 06	-	-	-	-	-	-	-	-44.77	**-44.77**
	NOV 07	-14.52	-		-	-	-33.23	-	-87.72	**-135.47**
	NOV 08	-	-22.57	-	-	-	-	-	-145.19	**-167.76**
	NOV 09	-	-	-46.68	-	-	-	-	-	**-46.68**
	NOV 10	-	-	-169.38	-	-	-	-	-	**-169.38**
	NOV 11	-	-	-20.36	-15.19	-	-	-	-	**-35.55**
	NOV 12	-	-	-22.67	-16.90	-	-	-	-	**-39.57**
	NOV 15	-	-	-3.47	-2.59	-	-	-	-	**-6.06**
	NOV 16	-	-	-15.63	-11.66	-	-	-	-	**-27.29**
TOTALS										**TOTALS BY ALTERNATIVE**
Alternative 2 (TSP)		-1.18	-1.33	-67.63	-18.95	-37.37	0	-20.67	-76.21	**-223.33**
Alternative 3		-28.53	-25.93	-278.19	-46.34	-40.86	-33.23	27.57	-310.42	**-735.93**

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.24 The impacts on floodplains would be significant as a result of the TSP. Table 6-4 shows the acres of floodplains impacted for each NOV levee section and any constraints or restrictions.

Table 6-4. Floodplain Impacts for Alternatives 2 and 3 by Levee Section

NOV Levee Section	Acres Impacted		Constraints/Restrictions
	Alternative 2 (TSP)	Alternative 3	
NOV 01	77.4	271.8	Abuts LA 39; Requires Additional ROW
NOV 02	0.8	2.8	Fronting Protection; Requires Additional ROW
NOV 05	95.3	124	Abuts LA 23 and electrical ROW; Requires Additional ROW
NOV 06	529.7	380.4	Requires Additional ROW
NOV 07	187.5	680.9	Abuts LA 23; Requires Additional ROW
NOV 08	160.5	557.7	Abuts LA 23; Requires Additional ROW
NOV 09	105.4	155.9	Requires Additional ROW
NOV 10	224.3	419.3	Requires Additional ROW
NOV 11	167	320.8	Requires Additional ROW
NOV 12	310.6	478.3	Requires Additional ROW
NOV 13	1.8	10.4	Requires Additional ROW
NOV 14	0	0	Existing ROW
NOV 15	45.2	99.08	Requires Additional ROW
NOV 16	163	230.1	Requires Additional ROW

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.25 Due to the requirement of a higher levee crest in certain areas to meet the criteria for protection from a Pre-Katrina design storm event, a wider levee base would be required. To accommodate a wider base, additional ROW acquisition, and thus, additional direct and permanent impacts on floodplains may be necessary along several NOV levee sections. Acres of floodplain impacts can be seen in Table 6-4. Similar to Alternative 2, the impacts on floodplains would be significant as a result of Alternative 3.

AQUATIC RESOURCES/FISHERIES

Alternative 1: No Action Alternative

6.26 Under Alternative 1 (No Action), there would be no change in elevation of existing NOV flood risk reduction structures within Plaquemines Parish instituted by the Federal government. The existing NOV levees would not be enhanced structurally and authorized design flood risk reduction would not be provided for these levee reaches. No further restoration, armoring, or accelerated completion of levees would occur within the NOV levee sections; thus, fisheries would not be impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.27 Under Alternative 2, expanding the footprint of various levees would have substantial direct impacts on existing fresh, intermediate, brackish and saline marshes; SAV; mud, sand and shell substrate; water bottoms; and water column. Some impacts would be temporary; however, many impacts would be major and permanent. Construction activities associated with the NOV

levees would cause sedimentation and contamination of waterways by toxic substances, adversely affecting fisheries in the project area. Alterations in water quality from sediment loading would impact fisheries by lowering DO and increasing water temperature of the affected waterbodies.

6.28 Additional effects from sediment suspension and siltation in waters adjacent to the construction/enhancement areas could adversely affect fish and other aquatic organisms by clogging gills, reducing growth rates, and disrupting egg and larval development. Construction activities associated with the removal of overhead cover or woody materials would degrade fish and other beneficial aquatic habitat by increasing flow rate and water temperatures, and by exposing species to predation by removal of cover.

6.29 Effective best management practices (BMP) for construction activities include diversion dikes, vegetative buffer strips, seeding and mulching, hay bale dikes, silt fencing, vegetative cover, sediment basins, and sediment traps. Construction site erosion and pollution control efforts are now emphasizing the most appropriate set of practices for a specific site, as well as correctly installing and maintaining the selected practices to ensure their effectiveness. Without use of BMPs, new construction sites and developments can result in a significant amount of pollution loading into adjacent waterbodies. If the BMP and mitigation measures discussed above are implemented, minor temporary and permanent impacts on aquatic resources would result from the implementation of the TSP.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.30 Alternative 3 would result in impacts on fisheries similar to those described above for Alternative 2. Some impacts would be temporary; however, many impacts would be permanent. The USACE has determined that the proposed flood risk reduction project would have significant adverse effects on various fisheries species and life stages.

ESSENTIAL FISH HABITAT

Alternative 1: No Action Alternative

6.31 Under Alternative 1 (No Action), the existing NOV levees would not be enhanced structurally and authorized design flood risk reduction would not be provided for these levee reaches. No further restoration, armoring, or accelerated completion of levees would occur within the NOV levee sections; thus, no EFH would be directly impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.32 Under Alternative 2, there are three main sources that would produce impacts on EFH. First, the expansion of the levee footprint into EFH areas would have permanent, direct impacts on existing fresh, intermediate, brackish, and saline marshes; SAV; mud, sand, and shell substrate; water bottoms; and estuarine water column. Second, dredging would displace or bury EFH areas or managed species; however, larger motile species could escape by avoiding disturbances. Last, temporary construction impacts from stormwater runoff would potentially occur in various EFH within the construction access corridors or roads and at discharge pipes, temporarily reducing water quality in EFH.

6.33 Due to the rapid wetland loss in the study area, impacts on marsh and SAV would have the most profound effect on managed fisheries species and associated life stages for which EFH has been designated in the study area. Table 6-5 is adapted from the GMFMC 2005 EIS regarding EFH in Southeast Louisiana.

Table 6-5. Sensitivity Indices "Effects" for EFH types in the Project Area

Types of EFH in Project Area	Physical Effects		Water Quality Effects	
	Dredge and Fill	Shoreline Hardening	Altered Freshwater	Non-Point Source
Estuarine				
Seagrasses	3	1	2	3
Benthic Algae	3	1	3	2
Drifting Algae	3	1	2	1
Emergent Marsh	3	3	3	1
Sand/Shell Bottom	3	1	1	2
Soft Bottom	3	1	1	2
Hard Bottom	3	1	2	2
Oyster Bars	3	2	3	2
Pelagic	2	1	2	2
Nearshore				
Seagrasses	3	2	2	3
Benthic Algae	3	1	3	2
Drifting Algae	3	1	2	1
Sand/Shell Bottom	3	3	2	2
Soft Bottom	3	3	2	2
Hard Bottom	3	3	2	2
Banks/Shoals	3	1	0	1
Reefs	3	3	3	2
Pelagic	3	3	1	2

3 – large effect, 2 – moderate effect, 1 – some effect, and 0 – not applicable or no effect.

6.34 Temporary and moderate adverse impacts from turbidity would potentially occur during construction. The greatest effects would be on benthic and fishery species or life stages with low or passive transport mobility. Often, construction-induced turbidity is no higher than that observed during frontal conditions (weather events) in estuaries (Ray and Clarke 2001).

6.35 Temporary and moderate adverse impacts on the estuarine and marine water column would result from dredging and disposal activities. It is possible that some Federally managed species in post-larval or juvenile stages may be displaced or buried in the immediate vicinity during the dredged material placement; however, larger motile species could escape by avoidance reactions to mechanical disturbances.

6.36 The expansion of the levee footprint would cause moderate permanent impacts on EFH adjacent to a number of NOV levee sections. Table 6-6 presents a summary of the anticipated permanent impacts on EFH resulting from the implementation of the NOV levee sections along the project corridor.

Table 6-6. Anticipated Permanent Impacts on Marsh and Open Water EFH Resulting from Implementation of Alternative 2 on the Flood Side of NOV Levee

NOV Levee Section	Acres of Freshwater Marsh	Acres of Brackish Marsh	Acres of Intermediate Marsh	Acres of Saline Marsh	Acres of Open Water
1	-	30	70.86	-	-
2	-	-	-	21.6	0.29
5	-	-	-	-	-
6	0.65	-	-	20.34	4.05
7	-	-	-	20.24	1.69
8	-	-	-	36.69	0.22
11	-	-	-	-	0.88
Sub-Total	0.65	30	70.86	98.87	7.13
Total					**207.51**

Source: USACE 2010

6.37 Approximately 207.51 acres of existing EFH marsh and open water bottoms would be permanently impacted; however, the CEMVK has committed to creating 134.25 AAHUs of intermediate, brackish, and saline marsh in open water areas. As a result of these actions, the CEMVK believes that adverse impacts on some types of EFH may occur, but the marsh creation would compensate for these impacts and the overall productivity of Federally managed species would be benefitted. Therefore, the implementation of Alternative 2 would have a moderate permanent impact on EFH in the region.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.38 Alternative 3 would result in impacts on EFH similar to those described above for Alternative 2. Temporary and moderate adverse impacts from turbidity would potentially occur during construction. The greatest effects would be on benthic and fishery species or life stages with low or passive transport mobility.

6.39 Temporary and moderate adverse impacts on the estuarine and marine water column would result from the dredging and disposal activities. It is possible that some Federally managed species in post-larval or juvenile stages may be displaced or buried in the immediate vicinity during the dredged material placement; however, larger motile species could escape by avoidance reactions to mechanical disturbances.

6.40 The expansion of the levee footprint would cause moderate permanent impacts on EFH adjacent to a number of NOV levee sections. Table 6-7 presents a summary of the anticipated permanent impacts on EFH resulting from the implementation of Alternative 3 along the project corridor.

Table 6-7. Anticipated Permanent Impacts on Marsh and Open Water EFH Resulting from Implementation of Alternative 3 on the Flood Side of NOV Levee

NOV Section	Acres of Freshwater Marsh	Acres of Brackish Marsh	Acres of Intermediate Marsh	Acres of Saline Marsh	Acres of Open Water
1	-	40.01	83.11	-	45.53
2	-	-	-	-	-
5	-	-	-	49.9	6.32
6	0.65	-	-	69.76	39.2
7	-	-	-	120.17	8.6
8	-	-	-	197.57	8.91
11	-	-	-	-	14.56
Sub-Total	0.65	40.01	83.11	437.4	123.12
Total					**684.29**

Source: USACE 2010

6.41 Approximately 684.29 acres of existing EFH intertidal marsh and open water bottoms would be permanently impacted. If Alternative 3 is implemented, CEMVK would commit to creating 378.85 WVA AAHUs of intermediate, brackish and saline marsh in open water areas.

6.42 As a result of these actions, the CEMVK believes that adverse impacts on some types of EFH may occur, but the marsh creation would compensate for these impacts and the overall productivity of Federally managed species would be benefitted. Therefore, the implementation of the Alternative 3 would have a moderate permanent impact on EFH in the region.

WATER QUALITY

6.43 Actions associated with construction of the NOV levee sections would have moderate, direct and indirect, short-term and long-term impacts on surface water quality. Stormwater runoff from the construction sites and staging areas for construction access to NOV levees and floodgates are considered direct temporary impacts. Some sections of the levee would restore the base footprint and encroach upon surface water and permanently fill the shorelines of channels and wetlands. The impacts of wetland encroachment are discussed in the Wetlands section of this SEIS.

Construction Activities

6.44 Construction activities associated with the project would modify the surface hydrology, increase turbidity, decrease DO, increase suspended sediments and may slightly increase water temperature. Each component of the NOV construction project would require a stormwater permit that would require the contractor to incorporate the use of BMPs to reduce pollutants from leaving the construction site during rain events. As part of the National Pollution Discharge Elimination System permit process, a General Stormwater Permit is required prior to construction, and this would include a site-specific Stormwater Pollution Prevention Plan

(SWPPP) and Notice of Intent (NOI). In addition, USACE contractors would need a site-specific Spill Prevention, Control and Countermeasure Plan (SPCCP) in place prior to the start of construction.

Displacement of Waterbodies with Fill Materials

6.45 There are several reaches along the NOV project area where the base of the earthen levee would expand into canals or wetlands to meet authorized height requirements. This would cause permanent direct impacts on wetlands and open water by filling in areas with dirt and rock. The result could impact water quality and fish habitat; the impacts on aquatic organisms are discussed in the Wetlands, Fisheries, and EFH sections.

Alternative 1: No Action Alternative

6.46 Under the No Action Alternative, water quality would not change as no additional flood risk reduction measures would be implemented along the existing NOV Federal levees.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.47 The implementation of Alternative 2 would create temporary impacts on water turbidity, DO, and biological oxygen demand during construction and would temporarily displace aquatic species. Short-term effects could include a temporary increase in erosion and sedimentation during construction. Disturbed soils and hazardous substances from construction equipment (*i.e.*, anti-freeze, fuels, oils, lubricants) could directly impact water quality during construction activities. These effects would be minimized through the use of BMPs. A General Stormwater Permit would be obtained prior to construction, and this would require approval of a site-specific SWPPP and NOI. A site-specific SPCCP would also be in place prior to the start of construction. BMPs outlined in these plans would reduce the potential for migration of soils, oil and grease, and construction debris through the local watersheds.

6.48 Effective BMPs for construction activities include diversion dikes, vegetative buffer strips, seeding and mulching, hay bale dikes, silt fencing, vegetative cover, sediment basins, sediment curtains, and sediment traps. Construction site erosion and pollution control efforts are now emphasizing the most appropriate set of practices for a specific site, as well as correctly installing and maintaining the selected practices to ensure their effectiveness. Without use of BMPs, new construction sites and developments can result in a significant amount of pollution loading into adjacent waterbodies.

6.49 Stormwater runoff from the construction sites and any designated staging areas for construction access to the NOV Federal levees and floodgates are considered direct, short-term impacts. BMPs outlined in the SWPPP and SPCCP plans would reduce potential migration of soils, anti-freeze, fuels, oils, lubricants and construction debris through the local watersheds. Once the construction project is complete and the levee has passed the compliance survey, it would be fine-dressed. Depending on the time of year the levee is completed, the contractor would plant either winter grass, summer grass or a combination of both. The USACE is working with independent botanists and university technical teams to develop grasses that germinate and grow quickly and remain solid and thick throughout the year. At the present time, Bermuda grass *(Cynodon dactylon)* is the preferred vegetative armor for levees (USACE 2008b). The

grass armoring would significantly mitigate the potential of non-point source pollution to enter local surface waters.

6.50 Table 6-8 provides a summary of the NOV levee restorations water quality impacts.

Table 6-8. NOV Levee Impacts on Water Quality

NOV Levee Section	Alternative	Water Quality Impacts (Acres of water impacted)
NOV 01	Alternative 2	103.98
	Alternative 3	257.58
NOV 02	Alternative 2	0.52
	Alternative 3	1.57
NOV 05	Alternative 2	28.22
	Alternative 3	63.20
NOV 06	Alternative 2	145.95
	Alternative 3	135.44
NOV 07	Alternative 2	26.64
	Alternative 3	350.33
NOV 08	Alternative 2	26.51
	Alternative 3	203.48
NOV 09	Alternative 2	44.36
	Alternative 3	82.71
NOV 10	Alternative 2	26.58
	Alternative 3	160.35
NOV 11	Alternative 2	19.91
	Alternative 3	118.71
NOV 12	Alternative 2	62.59
	Alternative 3	175.06
NOV 13	Alternative 2	0.78
	Alternative 3	8.31
NOV 14	Alternative 2	0.90
	Alternative 3	1.52
NOV 15	Alternative 2	6.91
	Alternative 3	34.89
NOV 16	Alternative 2	30.14
	Alternative 3	113.76

6.51 Some sections of the levee would restore the base footprint and encroach upon waterbodies and permanently fill the shorelines of channels, marsh, and wetlands. Impacts on wetlands from construction of NOV proposed projects were analyzed using WVA methodology. The results of the WVA provide an estimate of the positive or negative environmental effects of a potential project. The WVA analysis is applied to the habitats that would be impacted by levee restorations, and if net negative impacts are determined, the WVA is applied to potential mitigation plans to develop appropriate compensatory mitigation. CEMVK would mitigate the

loss of wetlands by restoring damaged aquatic systems located in other sections within the impacted sub-basin.

6.52 Impacts on water quality resulting from the implementation of Alternative 2 would have minimal, direct, and indirect short-term impacts on surface water quality in the immediate project area. The TSP would not be expected to have a significant effect on the region's water quality.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.53 The impacts on water quality resulting from the implementation of Alternative 3 would be similar to those described in Alternative 2. There would be minimal, direct, and indirect short-term impacts on surface water quality in the immediate project area. However, the direct and indirect impacts are not expected to have a significant effect on the large-scale water quality resources in the project area.

TERRESTRIAL RESOURCES

Alternative 1: No Action Alternative

6.54 Under Alternative 1 (No Action), no further restoration, armoring, or completed acceleration of levees would occur within the NOV levee sections; thus, no upland terrestrial resources would be impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.55 Under Alternative 2, site preparation and construction within the previously disturbed areas of all NOV levee sections have little potential to affect upland resources within the project corridor. No significant non-wetland or upland resources occur within the levee footprint at any of the NOV levee sections. Uplands within the project area consist of remnant levee and non-wet BLH forests, and former agricultural fields that are generally vegetated by shrub/scrub, and ruderal communities. With the implementation of the TSP, there would be no adverse, significant impact on upland resources. It is possible, however, that in the short-term, site preparation and construction disturbances could cause temporary adverse impacts through increased spread and propagation of viable seed sources of non-native and invasive species within and near the project area. Revegetating the disturbed areas with native species after project construction is complete would likely limit the spread of non-native and invasive plant species.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.56 Alternative 3 would result in increased impacts on terrestrial upland resources by removing dry BLH and scrub-shrub habitat from the project area. Short-term impacts would be similar to those listed in Alternative 2; however, permanent adverse impacts would occur in the project area due to loss of wildlife habitat, nesting, and foraging area.

WILDLIFE

Alternative 1: No Action Alternative

6.57 Under Alternative 1 (No Action), no further restoration, armoring, or accelerate completion of levees would occur within the NOV levee sections; thus, no wildlife would be impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.58 Under Alternative 2, site preparation and construction would have a temporary, minor impact on wildlife within and near the project corridor during the construction period within all NOV levee sections. Wildlife species which would be most directly impacted from the implementation of the TSP would be small mammals, reptiles, and amphibian species. Construction activities associated with T-walls, would temporarily degrade foraging habitat for ducks and wading birds and could temporarily affect the movement of common wildlife within the project area. The greatest movement of small animals generally happens when a disturbance such as grading, dozing, or construction occurs. The majority of mobile animals, including birds, generally escape to areas of similar habitat. However, the loss of wetland habitat in the project area could adversely impact waterfowl that use the waterways for foraging, nesting and migration stop over's. In general, the displacement and/or reduction in the number of animals would not severely impact animal communities due to the presence of similar habitats adjacent to the project area and regional commonness of the species displaced.

6.59 The impacts on foraging habitat and ground nesting habitat would not be significant due to the presence of similar habitats adjacent to the project area. Construction activities associated with T-walls would temporarily impact foraging habitat for resident duck species and wading birds. However, no long-term significant impacts on wildlife habitat would be expected. The potential for migratory birds to use the project area is high, as the adjacent marshes attract several migratory birds and nesting activity is common. If construction activity occurs between 1 February and 31 August, any migratory birds nesting within the project area could be affected. If construction activities begin during migration season, migratory bird surveys would be conducted and active nests would be avoided.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.60 The larger footprint for Alternative 3 would cause permanent, adverse impacts on wildlife due to the greater amount of habitat (BLH, wetlands, scrub-shrub, *etc.*) that would be destroyed or modified as a result of the Proposed Action. Small organisms may be destroyed during construction activities. Mobile animals, including birds, would escape to other adjacent, similar habitat, but the loss of important foraging and nesting habitat within the project area would adversely impact wildlife.

THREATENED AND ENDANGERED SPECIES

Alternative 1: No Action Alternative

6.61 Under Alternative 1 (No Action), no further restoration, armoring, or accelerated completion of levees would occur within the NOV levee sections; thus, no T&E species would be impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.62 Under Alternative 2, site preparation and construction within the previously disturbed areas of all NOV levee sections would have no effect on T&E species within Plaquemines Parish.

6.63 West Indian manatees graze on a variety of aquatic plants and are typically found in waters with dense submerged aquatic beds or floating vegetation. They occasionally enter Lake Pontchartrain and associated coastal waters from June through September; but, the likelihood of a manatee occurring in the project area is extremely low since it is outside of their normal range and no aquatic plants suitable as a food source are located in the project area. Therefore, Alternative 2 would not adversely affect the West Indian Manatee.

6.64 No brown pelican or bald eagle breeding or nesting areas are known to occur in the vicinity of the project area. These birds are more likely to use the waters and associated habitats in the project area for foraging and feeding. The mobility of these bird species is such that construction activities are not expected to harm or interfere with their activities, and the brown pelican and bald eagle would be able to relocate to similar habitats in the vicinity of the project area for foraging and feeding during site preparation and construction activities. Alternative 2 would not adversely affect the brown pelican.

6.65 It is anticipated that Gulf sturgeon, pallid sturgeon, sea turtles, and peregrine falcon would forage and rest in unaffected areas at a sufficient distance from the project area during site preparation and construction since they are mobile and able to do so. Pallid sturgeons are accustomed to turbid water. However, disturbance to river bottoms and near-shore areas as a result of the construction could cause temporary, adverse impacts on aquatic species. Silt curtains, if deployed in the project area, could impede the migration of species or tangle and entraps fishes and sea turtles. If silt curtains are deployed in the Mississippi River, the project would not adversely affect Gulf and pallid sturgeons.

6.66 The piping plover utilizes this portion of the southern coast of Louisiana as part of its winter range; however, none of the NOV levee sections are within the designated critical habitat units for the Federally and state-threatened piping plover and it is not likely that piping plovers would forage along the levee corridor. Therefore, USACE has determined that the project would not affect the piping plover.

6.67 If at any time throughout the implementation of Alternative 2, it becomes apparent that the project has the potential to affect T&E species or their habitats, then consultation would be initiated with USFWS, NOAA Fisheries, or LDWF to minimize any impacts and to identify additional proposed mitigation.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.68 Alternative 3 would result in impacts on T&E species similar to those described above for Alternative 2, although due to the larger footprint of the project, more adverse impacts could occur.

RECREATIONAL RESOURCES

Alternative 1: No Action Alternative

6.69 Under Alternative 1 (No Action), no further restoration, armoring, or accelerated completion of levees would occur within the NOV levee sections; thus, no recreational resources would be impacted.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.70 Alternative 2 would result in temporary increased noise levels near construction activities and could impact recreational resources such as hunting, fishing, and bird watching near the construction zone along all the NOV levee sections. Noise levels would return to pre-construction levels following the completion of the project. Additional ROW may expand into marsh or open water habitats near the project area. Although fish and wildlife habitat disturbance may occur due to construction, the surrounding area provides enough suitable habitats that hunting and fishing activities should not be significantly impacted in the long-term. While the indirect and direct short-term impacts may be moderate, the indirect and direct long-term impacts would be less than significant.

6.71 Table 6-9 lists recreational resources and facilities in the project corridor that may be impacted by implementation of the TSP.

Table 6-9. NOV Levee Impacts on Recreational Resources

NOV Levee Section	Recreational Resources Impacts
NOV 01	Access to boat launches (*e.g.*, Beshel boat launch), camps, marinas, and businesses, such as the Suburban Rod and Gun Club, may be temporarily impacted due to construction.
NOV 05	Many hunters or fishermen that use Grand Bayou Road or Myrtle Grove Marina for access may be temporarily impacted by construction.
NOV 06	Approximately 4 acres of Prea Park would be permanently lost as a result of the expanded footprint.
NOV 07	Access to Morel's Gulf Coast Park and Campground and Joshua's Marina may be temporarily impacted.
NOV 08	Cypress Cove Marina, Venice Marina, and several fishing charters accessed from LA 23 outside of the levee system may be temporarily impacted while construction occurs near the road.
NOV 16	Access to Delta Marina Boating Center from the Mississippi River may be temporarily impacted during construction.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.72 Alternative 3 would result in impacts on recreational resources similar to those described above for Alternative 2. However, Alternative 3 would result in a greater loss of habitat for fishing and hunting land use than Alternative 2.

CULTURAL RESOURCES

Alternative 1: No Action Alternative

6.73 Under the No Action Alternative, no effect on cultural resources would occur. Cultural resources would continue to succumb to the effects of natural and human-induced processes

which currently exist. By implementing the No Action Alternative, the human landscape protected by the NOV levees would remain susceptible to the damaging consequences of future storm induced flooding. Cultural resources within this landscape would also be included under this threat.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.74 All recommendations are based on field investigations and laboratory artifact analysis and are pending SHPO concurrence. A Cultural Resources Management Summary is being prepared by USACE for submittal to the SHPO and Tribes. In addition, USACE would enter into a Programmatic Agreement with SHPO which would act as alternative arrangements in order to comply with Section 106 of the NHPA. Under the Programmatic Agreement, any additional archaeological work, including testing of the sites recommended eligible for NRHP and those of unknown eligibility, would be completed prior to construction within proximity to the subject sites. This Programmatic Agreement would allow USACE to fully comply with the NHPA.

6.75 No impacts on cultural resources would be anticipated as a result of implementation of the TSP along NOV 01, NOV 02, NOV 05, NOV 06, NOV 07, NOV 08, NOV 12, NOV 13 and NOV 14 because no eligible or undetermined sites are located within the APE. The following describes the project impacts on cultural resources located along NOV 09, NOV 10, NOV 11, NOV 15, and NOV 16.

NOV 09

6.76 One site of undetermined eligibility (16PL245) and one site of potential eligibility (16PL231 Locus 1) were recorded in the current investigation and are partially located within the TSP ROW. Sites within the designated ROW would not be avoided. Implementation of the TSP would result in ground-disturbing activities across a portion of these three sites, potentially significantly impacting their integrity, research potential, and historic value. For the site of undetermined eligibility (16PL245), further testing is recommended to determine if the archaeological deposits located within the proposed ROW are historically significant and potentially eligible for the NRHP. For the portion of Site 16PL231 Locus 1 located within the proposed ROW, the USACE has made a preliminary finding of adverse effect, and the process to mitigate for adverse effects would be undertaken prior to construction.

NOV 10

6.77 Ten sites of undetermined eligibility (16PL208, 16PL210, 16PL211, 16PL212, 16PL214, 16PL215, 16PL216, 16PL219, 16PL220, and 16PL230) and two sites of potential eligibility (16PL217 and 16PL231 Locus 2) were recorded in the current investigation. Among the sites of undetermined eligibility, six sites (16PL211, 16PL215, 16PL216, 16PL219, 16PL220, and 16PL230) are located outside of the proposed ROW for the TSP and would not be adversely impacted by the TSP. For the remaining four sites of undetermined eligibility (16PL208, 16PL210, 16PL212, and 16PL214) a portion of each site is located within the proposed ROW for the TSP. Sites within the designated ROW would not be avoided. Implementation of the TSP would result in ground-disturbing activities across these four sites potentially significantly impacting their integrity, research potential and historic value. For the four sites of undetermined eligibility that are partially located within the proposed ROW for the TSP, further

testing is recommended to determine if the portions of the sites located within the proposed ROW are historically significant and potentially eligible for NRHP.

6.78 Potentially eligible sites 16PL217 and 16PL231 Locus 2 are located outside of the proposed ROW for the TSP and would not be adversely impacted by the TSP.

NOV 11

6.79 The expanded ROW required along NOV 11 for Alternative 2 that passes through the southeastern boundary of the Fort Jackson National Landmark has been subject to extensive previous investigation that found no significant historic resources related to the fort (Hunter 1992). Additionally, a 1989 assessment of aesthetic impacts on Fort Jackson for previous levee construction that includes the downriver portion of NOV 11, determined that the increase in levee height and cross-section would be barely detectable from the fort and would not present a significant viewshed issue (USACE 1989). Similarly, the proposed height (2 ft) and cross-section increase in the current project would not result in a significant viewshed issue for the National Landmark. One site of undetermined eligibility (16PL238) was recorded in the current investigation. Implementation of the proposed TSP would result in ground-disturbing activities across 16PL238 potentially significantly impacting its integrity, research potential, and historic value. Sites within the designated ROW would not be avoided. Further testing is recommended for 16PL238 to determine if the archaeological deposits present are historically significant and potentially eligible for the NRHP.

NOV 15

6.80 Field survey of the Alternative 2 expanded ROW along the Point Michel floodwall encountered Site 16PL206. The eligibility recommendation for 16PL206 is undetermined. A portion of site 16PL206 is located within the proposed ROW for the TSP. Sites within the designated ROW would not be avoided. Implementation of the TSP would result in ground-disturbing activities across a portion of 16PL206 potentially impacting its integrity, research potential, and historic value. For 16PL206, further testing is recommended to determine if the archaeological deposits present within the proposed ROW for Alternative 2 are historically significant and potentially eligible for the NRHP.

NOV 16

6.81 During field investigation, four sites were discovered within the ROW for the proposed TSP restorations. Three of the archaeological sites are recommended ineligible for the NRHP and require no further work. Site 16PL231 Locus 3 is recommended potentially eligible for the NRHP, but is located outside of the proposed ROW for Alternative 2 and would not be adversely impacted by the TSP.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.82 All recommendations are based on field investigations and laboratory artifact analysis and are pending SHPO concurrence.

NOV 01

6.83 The results of archival investigation to determine the extent of previously reported cultural resources within 1 mile of the proposed expanded Alternative 3 ROW for NOV 01 are

the same as for the Alternative 2 ROW. Field survey for this project included most of the expanded ROW necessary for the increased authorized Pre-Katrina (GDM) level of risk reduction afforded by Alternative 3 except for two discrete locations. These locations occur at the upriver origin of NOV 01 in the space between where LA 39 intersects with River Road and a spur heading upriver along the MRL from the downriver terminus of NOV 01. The upriver location was previously surveyed by Goodwin et al. (1986), with one ineligible site (16PL142) recorded. Impacts are not anticipated at this upriver section of expanded ROW for Alternative 3, as well as the remaining length of NOV 01 up until the additional spur at the downriver terminus of the reach. The downriver location has not been previously surveyed; therefore, impacts are unknown at that location.

NOV 02

6.84 The archival investigation to determine the extent of previously reported cultural resources within 1 mile of the proposed Alternative 3 expanded ROW for NOV 02 is the same as that for the Alternative 2 ROW. Field survey for this project did not include the expanded ROW on the protected side of the pump houses necessary for the increased authorized Pre-Katrina (GDM) level of risk reduction afforded by Alternative 3. Impacts in the expanded ROW for Alternative 3 at NOV 02 are unknown.

NOV 05

6.85 The difference in additional expanded ROW for Alternative 3 versus that for Alternative 2 for NOV 05 was included in the boundaries of the archival and field survey investigations for this project, except for a 492-ft by 443-ft parcel at the downriver terminus of the reach. With the exception of the unsurveyed area at the terminus of the NOV 05 reach, no impacts on cultural resources are anticipated as a result of implementation of Alternative 3 for NOV 05. Impacts on the unsurveyed parcel of expanded ROW for Alternative 3 at NOV 05 are unknown.

NOV 06

6.86 The expanded ROW for Alternative 3 was included in this project investigation, with the exception of approximately 33 ft extending the entire length of the reach on the protected side of the levee. Potential impacts on cultural resources if Alternative 3 is implemented are expected to be similar to Alternative 2 impacts, with the exception of the 33-ft strip extending outside the ROW along the protected side of the levee. Impacts on cultural resources within the unsurveyed portion of expanded Alternative 3 ROW are unknown.

NOV 07

6.87 The implementation of Alternative 3 for NOV 07 would be similar to Alternative 2, which would have no impacts on previously reported cultural resources. Field survey for this project did not cover the entire footprint of the Alternative 3 expanded ROW for NOV 07. For the majority of the expanded Alternative 3 footprint of NOV 07, no impacts are anticipated. For portions of the ROW exceeding the 200-ft field surveyed on the protected and flood side of the existing levee, impacts are unknown.

NOV 08

6.88 The implementation of Alternative 3 for NOV 08 would be similar to Alternative 2, which would have no impacts on previously reported cultural resources. Field survey for this

project did not cover the entire footprint of the Alternative 3 expanded ROW for NOV 08. For the majority of the expanded Alternative 3 footprint of NOV 08, no impacts are anticipated. For portions of the ROW exceeding the 200-ft field surveyed on the protected and flood side of the existing levee, impacts are unknown.

NOV 09

6.89 Archival and field investigation for the Alternative 2 ROW for NOV 09 also included the area covered by the proposed Alternative 3 expanded ROW. As a result, similar impacts on cultural resources in the expanded ROW for NOV 09 would be expected to occur if Alternative 3 were implemented.

NOV 10

6.90 Archival and field investigation for the Alternative 2 ROW for NOV 10 also included the area covered by the proposed Alternative 3 expanded ROW. Among the 10 sites of undetermined eligibility, eight sites (16PL210, 16PL211, 16PL212, 16PL214, 16PL215, 16PL216, 16PL219, and 16PL220) are located outside of the proposed ROW for Alternative 3 and would not be adversely impacted. For the two remaining sites of undetermined eligibility (16PL208 and 16PL230) a portion of each site is located within the proposed ROW for Alternative 3. Sites within the designated ROW would not be avoided. Implementation of Alternative 3 would result in ground-disturbing activities across these two sites, potentially impacting their integrity, research potential and historic value. For sites 16PL208 and 16PL230, further testing is recommended to determine if the portions of the sites located within the proposed ROW are historically significant and potentially eligible for NRHP.

6.91 Two sites of potential eligibility (16PL217 and 16PL231 Locus 2) were also found during surveys conducted in the current investigations. Site 16PL217 is located outside of the proposed ROW for Alternative 3 and would not be adversely impacted by Alternative 3. A portion of Site 16PL231 Locus 2 is located within the proposed ROW for Alternative 3 and implementation would result in ground-disturbing activities across the site, potentially impacting its integrity, research potential and historic value. Sites within the designated ROW would not be avoided and mitigation procedures would be implemented

NOV 11

6.92 Archival and field investigation for the Alternative 2 ROW for NOV 11 also included the area covered by the proposed Alternative 3 expanded ROW, except for a 1,903-ft section where NOV 11 and NOV 15 meet in Triumph and the area encompassing the Fort Jackson National Landmark. For the 1,903-ft section at the intersection with NOV 15, impacts are unknown. For the area encompassing the Fort Jackson National Landmark, impacts will be significant and a mitigation plan is recommended if Alternative 3 is implemented. Sites 16PL236, 16PL237, and 16PL238 are located within the proposed Alternative 3 ROW and would have impacts similar to the Alternative 2 impacts.

NOV 12

6.93 Archival and field investigation for the Alternative 2 ROW for NOV 12 also included the area covered by the proposed Alternative 3 expanded ROW, except for the area encompassing Fort Jackson and the point bar along Plaquemines Bend. For the area encompassing the Fort

Jackson National Landmarks, impacts would be significant, and a mitigation plan is recommended if Alternative 3 were implemented. For the area encompassing the Plaquemines Bend point bar, impacts are unknown. For the majority of NOV 12 downriver from the Plaquemines Bend point bar, no impacts on cultural resources would be anticipated if Alternative 3 is implemented.

NOV 13

6.94 Archival and field investigation for the Alternative 2 ROW for NOV 13 also included the area covered by the proposed Alternative 3 expanded ROW. No impacts on cultural resources would be anticipated as a result of implementation of the Alternative 3 for NOV 13.

NOV 14

6.95 Archival and field investigation for the Alternative 2 ROW for NOV 14 also included the area covered by the proposed Alternative 3 expanded ROW. No impacts on cultural resources would be anticipated as a result of implementation of the Alternative 3 for NOV 14.

NOV 15

6.96 Archival and field investigation for the Alternative 2 ROW for NOV 15 also included the area covered by the proposed Alternative 3 expanded ROW except for the Venice floodwall armoring and restoration. As a result, the same impacts anticipated for the Alternative 2 expanded ROW for NOV 15 would be expected to also occur if Alternative 3 were implemented, with the exception of the Venice floodwall armoring and restoration. The expanded ROW at the Venice floodwall exceeds the 200-ft corridor surveyed for this investigation, and as a result, impacts on cultural resources at that location are unknown.

NOV 16

6.97 Archival and field investigation for the Alternative 2 ROW for NOV 16 also included the area covered by the proposed Alternative 3 expanded ROW. As a result, the same impacts anticipated for the Alternative 2 expanded ROW for NOV 16 would be expected to also occur if Alternative 3 is implemented.

TRANSPORTATION

Alternative 1: No Action Alternative

6.98 Without further restoration, armoring, and accelerated completion of floodwalls, levees, or floodgates, the project area would be subject to flooding in the event of a large tropical storm event similar to Hurricane Katrina. All roadway segments in the project area would be inundated and temporarily inaccessible in the event of overtopping of the authorized flood risk reduction.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.99 Flagmen, signage, cones, barricades, and detours would be used where required to facilitate movement of construction equipment, construction materials, and local traffic on affected road segments. The proposed design of all areas would require methods to avoid exposure of adjacent traffic routes and other urban developments. Appropriate measures to ensure safety and facilitate the movement of traffic would be implemented. The proposed staging areas are not known at this time, but it is assumed that some traffic congestion would occur near the designated staging areas. Large quantities of material would be delivered to

construction sites, as well as to other ongoing flood risk reduction projects in the area. This could have localized short-term impacts on transportation corridors throughout the project area.

6.100 Table 6-10 describes the roadways that would be impacted within the NOV levee project corridor under the TSP. Construction easements and transport of construction equipment and materials would temporarily impede vehicle traffic and result in a minimal reduction of the level of service (LOS; a metric describing traffic volume relative to capacity) along major roadways such as LA 23, LA 39, and Hwy 15, and on some local road segments. This would result in minimal, temporary impacts including temporary road closures and congestion in those areas where construction would occur. Portions of several roadways would need to be realigned since they are located within the project footprint which would result in significant, long-term adverse impacts.

Table 6-10. Roadway Impacts Within the NOV Levee Project Corridor

NOV Levee Section	Temporary Roads Impacts	Roads to be Realigned	Access Roads Used
NOV 01	LA 39, Hwy 15	Portions of LA 39, Hwy 15, Schayot Rd., Kelly's Rd., United Gas Rd., Bass Rd., and the Point á La Hache Boat Harbor Rd.	None
NOV 02	LA 39, Hwy 15	None	None
NOV 05	LA 23	Portions of LA 23, Grand Bayou Rd.	St. Jude Ln., Fosters Rd.
NOV 06	LA 23	Martin Ln., Azalea Dr., North St., South St., Penny Dee Dr., High Ridge Marina Rd., St. Anthony Ln., West Bellevue Dr., West Tessie Ln., Stephyll Loop, Milan Ave., and several unnamed dirt roads	North St., School Rd., Milan Ave., West Paula Dr., Martin Ln., unnamed dirt road
NOV 07	LA 23	Amvina Rd., Buras Boat Harbor Rd., several unnamed dirt roads	Triumph Pump Rd., two unnamed dirt roads off of LA 23
NOV 08	LA 23	LA 23 at the southern terminus, Nells Ln.	Duvic Pump Rd., Compactor Rd.
NOV 09	LA 23, Diamond Rd.	Portions of LA 23 and Diamond Rd.	Diamond Rd., unnamed road
NOV 10	LA 23, Port Sulphur Rd., Hwy 11	Portions of LA 23, Cat Bay Rd., Bally Ln., Patricks Ln., Gilberts Ln., Antoine Ln., Buras Ln., Veronas Ln., Treadway Ln., East Tessie Ln., and Oakridge Dr.	River Rd., Levee Rd., two unnamed dirt roads
NOV 11	LA 23, Hwy 11	Portions of Hwy 11, Herbert Harvey Dr., Pipeline Dr., Buras River Rd., East Crest Dr., Gartoucies Ln., Cognevich Ln., Plumer Dr., Ladart Dr., and Everard Ln.	Hwy 11, East Gulf Dr.

Table 6-10, continued

NOV Levee Section	Temporary Roads Impacts	Roads to be Realigned	Access Roads Used
NOV 12	LA 23, Boothville River Rd.	Portions of Jump Basin Rd., Lucilles Ln., Hamann Ln., Guns Ln., Sisung Ln., Marathon Ln., GBH Ln., Bertha Ln., Boyd Ln., Dels Ln., Riverside Ln., Sewer Plant Rd., Allridge Ln., Boothville River Rd., Karen Ln., Gille Ln., Assembly of God Ln., Arist Ln., Deadsmans Ln., Goodman Ln., Granier Ln., Williams Ave., Clarence Ln., Saxons Ln., Herbert Ln., Duncan Ln., Whitney Ln., Golton Ln., Rodgers Ln., Ernies Ln., Paul Morgan Rd., Prout Ln., Kelley Ln., Roosevelt Pansy Ln., Blanchard Ln., Frickey Ln., and Phil Ln.	None
NOV 13	LA 23	None	None. Would be accessed by barge
NOV 14	LA 23	None	Levee Rd., Back Levee Rd., Empire Loop South
NOV 15	LA 23	Portions of Hwy 11, Jump Basin Rd., Mitchell Ln., Anthony Ln., Lulich Ln.	Triumph Pump Rd.
NOV 16	LA 23, Hwy 11	Portions of River Dr., Banks St., Orange St., John R. Rd., Locks Rd., and Adams Loop Rd.	Locks Rd., two unnamed roads

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.101 This alternative would result in temporary construction impacts on local road traffic for all NOV levee reaches similar to those described occurring under Alternative 2; however, the duration of construction would be longer which would cause more traffic congestion for a longer period of time within the transportation corridor.

Transportation of Borrow

6.102 This section of the analysis focuses on the potential impacts from transporting GF (and CF borrow material, if deemed to be in the best interest of the government for a particular contract) to construction sites. While contractors may use borrow from an approved CF borrow site as discussed in the IERs, the possibility also exists that a contractor may use an alternative borrow source for which the environmental consequence, including transportation impacts, have not yet be assessed. Methodology used is based on the CEMVN March 2009 report, "Transportation Report for the Construction of the 100-Year Hurricane and Storm Damage Risk Reduction System" (USACE 2009), which analyzed the impacts of transporting borrow material with truck, rail, and barges to construction sites (Appendix J). The transportation analysis for this SEIS was based off the methodology used in the CEMVN HSDRRS report and will present any potential impacts from transporting material during the construction phase.

6.103 The total road mileage (major highways and interstates) required for the completion of the project, as well as expected diesel emissions that are a result of the miles traveled are analyzed. The major assumption is that earthen fill material would not be moved by any other transportation mode other than truck, although the possibility does exist for barge or rail transport of other types of material necessary for the construction. If other modes of transport

are utilized and additional impacts are identified, supplemental NEPA coordination will be provided to analyze the impacts to the environment. The truck used for this study is a heavy duty-diesel with a gross vehicle weight rating of 80,000 pounds providing the transporting capacity of 14.5 cy of borrow material per load.

Material Delivery Assumptions

6.104 The primary objective in the transportation impact analysis was to determine the most logical path for transporting construction material from potential GF and CF borrow sites to the project area and to assess the impact of this transportation.

6.105 The determination of the logical path required the locations of potential borrow pits and location of access roads to the construction sites for delivery. Geographic Information Systems (GIS) software (ESRI ARC-MAP and Google Earth) was used to determine the mileage from potential borrow pits to the construction site. In this analysis, only major highways or interstates were used for delivery of borrow. Fortunately, the majority of potential borrow pits that were considered in this analysis were adjacent or close to major roads. In this analysis, the large majority of roads used included Interstates 10 and 510, LA Hwys 90 and 23, Belle Chasse Highway, and West Bank Expressway.

Projects and Quantities

6.106 Table 4-3 in Section 4 provides quantity estimates of the borrow material needed to construct the NOV levee sections, approximately 90 miles, in Plaquemines Parish. Tables 4-4 and 4-5 in Section 4 identified some potential GF and CF borrow sites that may be used during the construction phase of the project, with the acknowledgment that a contractor may opt to use an alternative borrow source that would require subsequent evaluation and issuance of a NEPA document.

Methodology

6.107 As mentioned, the basic methodology used for this analysis was based off the March 2009 CEMVN transportation study. Google Earth was used to measure the miles from potential borrow sites to defined access roads for each section of the levee. By taking the number of truck loads of materials and multiplying by the round trip mileage to the borrow pit, a value of miles traveled for each levee section was computed.

6.108 In the analysis conducted by CEMVN, diesel emissions were calculated by the Mobile Source Emission Factor (MOBILE) model. MOBILE is an EPA emission factor model for predicting gram per mile emissions of the priority pollutants and other toxics from on-road vehicles under various conditions. The MOBILE model requires the user to identify certain values to quantify on-road emissions from materials transported. The variables used include type of truck used to transport material, miles traveled to construction site, and the rate at which the truck would emit pollutants during the process.

Results

6.109 Table 6-11 shows the total mileage, truck loads of borrow material needed, and the average round trip mileage for each section.

Table 6-11. Total Mileage and Required Truck Loads to Complete Construction of the NOV Federal Levees

Levee Section	Quantity (cy)	Truck Loads	Mileage	Average Round Trip
NOV 01	6,378,000	439,862	23,312,686	53
NOV 02	28,000	1,931	102,343	53
NOV 05	1,388,000	95,724	7,945,092	83
NOV 06	172,000	11,862	1,281,096	108
NOV 07	3,156,000	217,655	28, 948,115	133
NOV 08	1,488,000	102,620	15,495,620	151
NOV 09	6,584,000	454,068	37,687,644	83
NOV 10	732,000	50,482	5,452,056	108
NOV 11	1,304,000	89,931	11,780,961	131
NOV 12	16,000	1,103	166,553	151
NOV 13	8,000	552	59,616	108
NOV 14	16,000	1,103	119,124	108
NOV 15	1,076,000	74,207	11,205,257	151
NOV 16	600,000	41,379	5,006,859	121
Total	**22,946,000**	**1,582,479**	**148,563,022**	**110**

6.110 Referring to Table 6-11, completing the project would result in about 150 million miles of road traveled to deliver over 1.5 million loads of borrow material. All major roads or interstates were assumed to be traveled with the occasional local road from borrow sites being utilized. On average, one round trip to deliver construction material was 110 miles. Other alternatives were analyzed to find an optimization rate for mileage, but the value presented was the best choice available.

Construction Staging Areas and Access Roads

6.111 Staging areas for the temporary storage of construction materials and access roads would be needed at various locations throughout the project area. The two main criteria for selecting staging and access route locations were: (1) the locations must not contain wetlands, as determined by USACE/USFWS land-use analysis and the USACE Regulatory Branch jurisdictional determination, and (2) the selected sites must be located within the cultural resources survey area and avoid impacts on cultural resources documented during the cultural resources survey. The results of the surveys were included in this SEIS and in a report, "Draft Management Summary, Phase I Cultural Resources Survey of New Orleans to Venice Federal Levees, Plaquemines Parish, 2010." Temporary staging areas would be located in nonforested cleared non-wetland areas in close proximity to the levees and construction. The locations of these areas were depicted previously in Figures 3-2 through 3-5. Access roads are discussed in the Transportation Section of Section 6 in this SEIS. If, during construction, it is determined that staging areas and access or haul roads would be situated outside the areas of analysis, then supplemental environmental documentation would be necessary.

6.114 Solid waste receptacles would be maintained at staging areas. Non-hazardous solid waste (trash and waste construction materials) would be collected and deposited in on-site receptacles. Solid waste would be collected and disposed of properly in accordance with the Solid Waste Disposal Act [P.L. 89-272, 79 Stat. 997, as amended by RCRA, P.L. 94-580, 90 Statute 2795 (1976)].

Alternative 1: No Action Alternative

6.115 Under the No Action Alternative, hazardous, toxic, and radioactive waste would not change as no additional flood risk reduction measures would be implemented.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.116 Because CEMVK plans to avoid RECs, the probability of encountering HTRW in the project area is low, and no direct impacts from HTRW would be anticipated. If a REC cannot be avoided, then the non-Federal sponsor would be responsible for remediation. If construction should reveal the existence of previously unknown HTRW, then work on that section would stop until the risk from HTRW can be evaluated and an appropriate response determined.

6.117 In addition, if hazardous waste would be encountered during NOV levee risk reduction construction, the contamination would be managed following LDEQ Risk Evaluation/Corrective Action Program (RECAP) Standards screening and management options. RECAP addresses risks to human health and the environment posed by the release of chemical constituents into the environment. RECAP screening standards represent contaminant concentrations within a specific environmental media that are protective of human health and the environment (LDEQ 2003).

6.118 In many cases, adjacent RECs were identified in the Phase I ESA as areas that were being used for illegal dumping. Should these adjacent debris sites remain, these trash or "dump" sites were generally found to be of little concern to the project area. As such, the probability of encountering HTRW in the course of the NOV levee project would still be low and direct impacts would not be anticipated.

6.119 The potential to create HTRW materials during the construction process is always a possibility. Storage, fueling, and lubrication of equipment and motor vehicles associated with the construction process would be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants, and oil would be managed and stored in accordance with all Federal, state, and local laws and regulations. Used lubricants and used oil would be stored in marked corrosion-resistant containers and recycled or disposed of in accordance with appropriate requirements.

6.120 The construction contractor would be responsible for any hazardous waste generated during construction and would be required to develop and implement a SPCCP during all construction activities.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.121 The impacts on hazardous, toxic, and radioactive wastes resulting from the implementation of Alternative 3 would be similar to those described in Alternative 2; however,

the construction process would be conducted in a manner that affords the maximum protection against spill and evaporation. Fuel, lubricants, and oil would be managed and stored in accordance with all Federal, state, and local laws and regulations. Used lubricants and used oil would be stored in marked corrosion-resistant containers and recycled or disposed of in accordance with appropriate requirements.

6.120 The construction contractor would be responsible for any hazardous waste generated during construction and would be required to develop and implement a SPCCP during all construction activities.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.121 The impacts on hazardous, toxic, and radioactive wastes resulting from the implementation of Alternative 3 would be similar to those described in Alternative 2; however, the potential for disturbances of RECs and for accidental spills would be greater due to the much larger footprint and longer construction times required for Alternative 3.

Section 122 Items

NOISE

Alternative 1: No Action Alternative

6.122 Under the No Action alternative, there would be no impact on the noise environment. The sensitive noise receptors near the project corridor would not experience additional noise associated with construction activities.

6.123 Table 6-12 presents noise emission levels for construction equipment expected to be used during the proposed construction activities. Anticipated sound levels at 50 ft from various types of construction equipment range from 76 dBA to 84 dBA, based on data from the Federal Highway Administration FHWA (2007).

Table 6-12. A-Weighted (dBA) Sound Levels of Construction Equipment and Modeled Attenuation at Various Distances[1]

Noise Source	50 ft	100 ft	200 ft	500 ft	1000 ft
Backhoe	78	72	68	58	52
Crane	81	75	69	61	55
Dump Truck	76	70	64	56	50
Excavator	81	75	69	61	55
Front end loader	79	73	67	59	53
Concrete mixer truck	79	73	67	59	53
Auger drill rig	84	78	72	64	58
Bull dozer	82	76	70	62	56

Source: FHWA 2007

1. The dBA at 50 ft is a measured noise emission. The 100- to 1,000-foot results are GSRC modeled estimates.

6.124 Construction would involve the use of auger drills which have a noise emission level of 84 dBA at 50 ft from the source. Assuming the worst case scenario, the noise model projected that noises levels of 84 dBA would have to travel 450 ft before they would be attenuated to an acceptable level of 65 dBA. To achieve an attenuation of 84 dBA to a normally unacceptable level of 75 dBA, the distance from the noise source to the receptor would need to be 140 ft.

6.125 Depending upon the number of construction hours, and the number, type, and distribution of construction equipment being used, the noise levels near the project area could temporarily exceed 65 dBA up to 450 ft from the project area. A number of sensitive noise receptors are located within 450 ft of the project corridor. For each NOV levee section, GIS were used to determine the number of sensitive noise receptors within 450 ft of the edge of the project corridor. Table 6-13 summarizes the total sensitive receptors from all NOV levee sections that would be temporarily impacted during construction activities.

Table 6-13. Sensitive Noise Receptors that May be Subjected to Noise Emissions Equal to or Greater than 65 dBA

NOV Levee Section	Alternatives	Sensitive Noise Receptors			
		Single Family Homes	Churches	Parks	Civic Facilities
NOV 01	Alternative 2	20	0	0	1 (prison)
	Alternative 3	23	0	0	1 (prison)
NOV 02	Alternative 2	0	0	0	0
	Alternative 3	0	0	0	0
NOV 05	Alternative 2	66	0	0	0
	Alternative 3	71	0	0	0
NOV 06	Alternative 2	38	0	1	1 (hospital)
	Alternative 3	52	0	1	1 (hospital)
NOV 07	Alternative 2	42	0	0	0
	Alternative 3	46	1	0	0
NOV 08	Alternative 2	88	0	0	0
	Alternative 3	88	0	0	0
NOV 09	Alternative 2	38	0	0	0
	Alternative 3	41	0	0	0
NOV 10	Alternative 2	123	1	0	0
	Alternative 3	144	1	0	0
NOV 11	Alternative 2	90	0	0	1 (Fort Jackson)
	Alternative 3	90	0	0	1 (Fort Jackson)
NOV 12	Alternative 2	92	0	0	0
	Alternative 3	93	0	0	0
NOV 13	Alternative 2	0	0	0	0
	Alternative 3	0	0	0	0
NOV 14	Alternative 2	8	0	0	0
	Alternative 3	8	0	0	0

Table 6-13, continued

NOV Levee Section	Alternatives	Sensitive Noise Receptors			
		Single Family Homes	Churches	Parks	Civic Facilities
NOV 15	Alternative 2	33	0	0	0
	Alternative 3	36	0	0	0
NOV 16	Alternative 2	59	0	0	0
	Alternative 3	59	0	0	0
Total	**Alternative 2**	**697**	**1**	**1**	**3**
	Alternative 3	**751**	**2**	**1**	**3**

Source: Satellite Imagery provided by Google Earth (2010)

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.126 Impacts on the ambient noise environment, resulting from the construction of the NOV levee sections would be expected to be temporary and minor. Approximately 697 single family homes, one church, one park, and three civic facilities are located within 450 ft of the edge of the project corridor. These sensitive noise receptors may experience noise emissions greater than 65 dBA which are normally unacceptable (HUD 1984). However, noise generated by the construction activities would be intermittent and last for approximately 2 years, after which noise levels would return to ambient levels. Therefore, the noise impacts from construction activities would be considered less than significant.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.127 Impacts on the ambient noise environment, resulting from the construction of the NOV levee sections under Alternative 3 are expected to be similar to those for Alternative 2. Approximately 751 single family homes, two churches, one park, and three civic facilities are located within 450 ft from the edge of the project corridor. The noise impacts from construction activities would be considered less than significant.

AIR QUALITY

Alternative 1: No Action Alternative

6.128 Under Alternative 1, the No Action Alternative, there would be no impacts on air quality in the region because there would be no construction activities associated with the NOV Federal levees.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.129 Temporary increases in air pollution from the proposed NOV Federal levee construction would occur from three main sources: 1) emissions from transportation of construction materials such as clay fill, concrete and concrete piling, stone and rocks to project sites; 2) combustible emissions from the engines of construction equipment, workers' automobiles commuting to work, and trucks shipping miscellaneous supplies to project sites; and 3) fugitive dust (PM-10) when soils are disturbed at the construction site. The following paragraphs describe the air calculation methodologies utilized to estimate air emissions produced by the construction of the NOV levee sections.

Air Emissions Associated with Transportation of Building Materials

6.130 This analysis addresses the air emissions from the transportation of building materials such as cement, sheet pilings, and clay fill materials from the borrow pits. The MOBILE 6.2 model was used to quantify the transport emissions from the large trucks used to transport material on public roads and highways. This analysis does not include non-road emissions from construction equipment used to construct the NOV levee sections. MOBILE 6.2 was used to generate emission factors for volatile organic hydrocarbon (VOC), CO, nitrogen oxides (NO_x), exhaust PM, SO_2, ammonia, and CO_2. The model calculates emission rates under various conditions affecting in-use emission levels (*e.g.*, ambient temperatures, average traffic speeds).

Air Emissions Associated with the Construction of NOV Levee Sections

6.131 Temporary increases in air pollution would occur from the use of construction equipment (combustible emissions) and the disturbance of soils (fugitive dust) during construction of the proposed NOV project components. The following paragraphs describe the air calculation methodologies used to estimate air emissions produced by construction activities.

6.132 Fugitive dust emissions were calculated using the emission factor of 0.19 ton per acre per month (Midwest Research Institute 1996), which is a more current standard than the 1985 PM-10 emission factor of 1.2 tons per acre-month presented in AP-42 Section 13 Miscellaneous Sources 13.2.3.3 (USEPA 2001). USEPA's NONROAD Model (USEPA 2005a) was used, as recommended by USEPA's *Procedures Document for National Emission Inventory, Criteria Air Pollutants, 1985-1999* (USEPA 2001), to calculate emissions from construction equipment. Combustible emission calculations were made for standard construction equipment, such as front-end loaders, backhoes, bulldozers, and cement trucks. Assumptions were made regarding the total number of days each piece of equipment would be used, and the number of hours per day each type of equipment would be used.

6.133 Construction workers and delivery trucks would temporarily increase the combustible emissions in the airshed during their commute to and from the project area. Emissions from construction worker commuters and delivery trucks traveling to the job site were calculated using the MOBILE 6.2 Model (USEPA 2005b, 2005c, and 2005d). Several sources of air pollutants would contribute to the overall air impacts of the construction project, including:

1. Transportation of building materials such as clay (borrow), sheet piling, *etc.*,
2. Combustible engines of construction equipment,
3. Construction workers' commute to and from work,
4. Supply trucks delivering miscellaneous materials to construction site, and
5. Fugitive dust from job site ground disturbances.

6.134 The air quality emissions were calculated for construction activities to compare to the General Conformity Rule *de minimis* thresholds (100 tons per year). Summaries of the total air emissions associated with the implementation of Alternative 2 are presented in Table 6-14 and details of the analyses are presented in Appendix E.

Table 6-14. Summary of Total Annual Air Emissions (tons/year) from the Implementation of Alternative 2

NOV Levee Section	NAAQS Criteria Pollutants (tons per year)						Greenhouse Gases (tons per year)		
	VOC	CO	NO_x	PM-10	PM-2.5	SO_2	CO_2	CO_2e	Total CO_2
NOV 01	11.8	77.8	120.2	91.3	16.3	15.3	12,631	37,515	50,146
NOV 02	3.5	17.3	29.1	5.9	2.7	3.1	2,469	9,110	11,578
NOV 05	9.1	66.7	85.5	61.2	11.1	10.1	8,887	26,698	35,585
NOV 06	13.0	87.0	129.5	91.9	16.8	15.3	12,872	40,412	53,285
NOV 07	11.8	82.5	118.4	91.0	16.0	14.4	12,202	36,945	49,146
NOV 08	10.8	78.8	106.0	90.2	15.1	12.5	10,840	33,084	43,924
NOV 09	8.3	60.6	79.0	74.7	12.1	9.0	7,915	24,651	32,566
NOV 10	14.2	98.3	148.2	93.0	17.9	18.3	15,276	46,228	61,503
NOV 11	14.9	112.2	155.0	93.2	18.1	18.3	15,786	48,362	64,148
NOV 12	13.6	101.3	139.0	92.2	17.1	16.4	14,170	43,369	57,538
NOV 13	3.5	19.1	25.1	9.2	2.8	2.7	2,293	7,849	10,142
NOV 14	3.0	14.1	20.7	8.9	2.5	2.2	1,832	6,491	8,323
NOV 15	10.1	68.8	100.4	48.3	10.7	11.4	9,799	31,344	41,143
NOV 16	12.8	86.6	131.3	91.8	16.8	15.5	13,074	40,968	54,042
Total	**140**	**971**	**1,387**	**943**	**176**	**164**	**140,044**	**433,025**	**573,070**

Source: 40 CFR 51.853 and GSRC model projections
* Note that Plaquemines Parish is in attainment for all NAAQS (USEPA 2010b)

6.135 As mentioned above, all the NOV levees reaches are located in Plaquemines Parish, which is in attainment for all NAAQS. Therefore, the air emissions generated by construction of the NOV levee sections would not trigger a conformity determination even if they exceed *de minimis* levels. As there are no violations of air quality standards and no conflicts with the SIPs, the direct and indirect impacts on air quality from the implementation of Alternative 2 would be short-term and insignificant. During the construction of the proposed project, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are within the design standards of all construction equipment. Dust suppression methods should be implemented to minimize fugitive dust. In particular, wetting solutions would be applied to the construction area to minimize the emissions of fugitive dust.

6.136 The GHGs emissions for NOV levee activities are estimated to be 433,025 tons a year for the TSP which is significantly greater than the CEQ guidelines that state that 27,557 tons is the threshold at which agencies should consider further quantitative and qualitative assessment of GHG emissions (CEQ 2010). The implementation of the TSP would have a major short-term impact on the regional GHG budget.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.137 Summaries of the total air emissions associated with the implementation of Alternative 3 are presented in Table 6-15 and details of the analyses are presented in Appendix E.

Table 6-15. Summary of Total Annual Air Emissions (tons/year) from the Implementation of Alternative 3

NOV Levee Section	NAAQS Criteria Pollutants (tons per year)						Greenhouse Gases (tons per year)		
	VOC	CO	NO_x	PM-10	PM-2.5	SO_2	CO_2	CO_2e	Total CO_2
NOV 01	14.1	87.4	150.7	135.0	22.5	19.8	15,893	47,029	62,921
NOV 02	6.1	28.0	52.2	7.8	4.5	5.7	4,365	16,303	20,669
NOV 05	9.1	66.7	85.5	88.9	13.9	10.1	8,887	26,698	35,585
NOV 06	14.8	94.0	151.9	134.8	22.4	17.9	14,758	47,390	62,148
NOV 07	11.8	82.5	118.4	132.5	20.1	14.4	12,202	36,945	49,146
NOV 08	12.1	89.5	121.8	132.6	20.2	14.4	12,457	38,012	50,469
NOV 09	9.9	74.2	96.7	110.3	16.6	11.1	9,732	30,194	39,926
NOV 10	16.3	117.6	173.2	135.9	23.4	21.1	17,828	54,042	71,871
NOV 11	17.4	129.4	183.8	136.5	24.0	22.0	18,834	57,340	76,174
NOV 12	15.9	123.0	135.2	135.2	22.7	19.2	16,792	51,307	68,099
NOV 13	3.5	19.1	25.1	9.2	2.8	2.7	2,293	7,849	10,142
NOV 14	3.7	17.1	30.0	13.0	3.5	3.1	2,504	9,372	11,876
NOV 15	12.8	86.6	131.3	50.4	12.6	15.5	13,074	40,968	54,042
NOV 16	13.2	94.5	136.1	92.1	17.0	16.2	13,852	42,472	56,324
Total	**161**	**1,109**	**1,592**	**1,314**	**226**	**193**	**163,470**	**505,921**	**669,392**

Source: 40 CFR 51.853 and GSRC model projections
*Note that Plaquemines Parish is in attainment for all NAAQS (USEPA 2010b).

6.138 The impacts on air quality for Alternative 3 are similar to those for Alternative 2. The impacts would be short-term and insignificant. The GHGs emissions for NOV levee activities are estimated to be 505,921 tons a year for Alternative 3, which is significantly greater than the CEQ guidelines that state that 27,557 tons is the threshold at which agencies should consider further quantitative and qualitative assessment of GHG emissions (CEQ 2010). The implementation of the Alternative 3 would have a major short-term impact on the regional GHG budget.

AESTHETIC VALUE (VISUAL RESOURCES)

Alternative 1: No Action Alternative

6.139 Under Alternative 1, visual resources would remain as stated in the existing conditions or be manipulated as dictated by future land-use maintenance requirements. This could include completing previously authorized actions for the area. No impacts on visual resources would be expected by these actions.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.140 The majority of the TSP footprint occurs within the existing ROW where similar flood risk reduction measures currently exist. The visual character of the project area, including all NOV levee sections, would be temporarily impacted by construction and transportation activities related to the project. However, the visual character of the project area should stabilize quickly following construction, and the project area would be returned, as much as possible, to pre-construction conditions. Aesthetics and visual resources associated with Fort Jackson, along

NOV 12, would be temporarily impacted during construction, but would return to pre-construction conditions after the project is complete. The TSP would not result in a significant change in the physical conditions of the environment or change the overall visual quality of the area. Long-term impacts on the visual resources of the area would occur due to the increased height of the risk reduction measures. However, because of the remote location and lack of public use and access to the project area, indirect or direct visual impacts would be permanent, but less than significant.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.141 Impacts on visual resources resulting from the implementation of Alternative 3 are expected to be permanent, but less than significant. Impacts would be similar to those described occurring under Alternative 2.

SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

LOCAL GOVERNMENT FINANCE, TAX REVENUES, AND PROPERTY VALUES

Alternative 1: No Action Alternative

Local Government Finance and Tax Revenues

6.142 Under this alternative, the housing values and business of the study area would change very little in the future. As a result, the tax revenues generated in the study area are presumed to remain stagnant. Without the levee restoration, armoring, and accelerated completion there would be no increase in local sales tax collections associated with the expenditures on materials and supplies and depressed economic growth due to limits on flood risk reduction and high insurance costs.

Property Values

6.143 The 2010 median values for specified owner-occupied housing units in the study area have increased between 7 and 53% since 2000 (U.S. Census Bureau 2000c and ESRI 2010).

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

Local Government Finance and Tax Revenues

6.144 Increased ROW would be necessary and land acquisitions would have limited impacts on property tax revenues.

6.145 Under Alternative 2, property values and, thus, property taxes could experience a short-term adverse impact because of the construction noise. The impact on tax revenue from a reduction in property values would be short-term and would likely return to, if not surpass, pre-construction conditions following the completion of levee construction because house values would be expected to rise with the additional protection.

6.146 Personal and business revenue would be lost from the acquisition of agricultural land and marshland areas (*e.g.*, loss of hunting lease revenue). Furthermore, tax revenue from property taxes generated from the businesses and houses that would be acquired and removed would decrease. However, agricultural land, marshland, residential and commercial land would be purchased for the fair market value of the land. In the long term, new businesses and new houses

would be built in the locality of the NOV levee system, and the value of these businesses and homes would increase with the newly offered flood risk reduction.

6.147 During construction, businesses may experience a short-term decrease in clientele due to construction noise or limited access, which would temporarily reduce tax revenues. However, increased economic activity in the local area from construction activities (such as local purchases by construction personnel, purchasing of supplies and equipment for construction, and housing needs) along the NOV project corridor could offset some, if not all, of the loss in business.

Property Values

6.148 Property values in the immediate vicinity of construction activities could be adversely impacted in the short-term because of noise impacts and the traffic congestion caused by the levee repairs and construction. Because the area is already impacted visually and aesthetically by the existence of levees and associated infrastructure, these proposed changes would not likely reduce aesthetics of the area; therefore, negligible impacts on property values would be expected with additional flood risk reduction infrastructure. In the long term, property values would be expected to increase with the additional flood risk reduction.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.149 Impacts on property values and mitigation measures to be implemented to reduce these impacts would be similar to those described by Alternative 2. Greater flood risk reduction would be provided with the implementation of Alternative 3; therefore, property values would be expected to increase even more.

DISPLACEMENT OF BUSINESSES AND FARMS AND EMPLOYMENT

Alternative 1: No Action Alternative

6.150 Under the No Action Alternative, businesses and farms would continue to be vulnerable to storm surges and hurricanes in the future. Additional displacement of businesses and farms (and therefore employment opportunities) would be possible under the No Action Alternative. Without the return of businesses to the area, employment opportunities would not improve; therefore, under the No Action Alternative, there would be an adverse permanent impact on farms and employment in the project area.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.151 Seven businesses would be displaced with the implementation of Alternative 2, causing a major, permanent impact on those businesses (Table 6-16). They would have to relocate and possibly, in the short-term, lose revenue, and employees might have to seek other jobs; relocation assistance would be provided if eligible under Public Law 91-646, as amended. Just compensation would be offered for the fair market value of the real estate interest to be acquired over private lands. The decrease in state revenue would be insignificant when compared to the revenue generated in the state. In the long term, businesses in the vicinity of the NOV levee system and newly built businesses would receive benefits from the flood risk reduction and less chance of future displacement.

Table 6-16. Total Number of Houses or Businesses that May be Displaced

NOV Levee Section	Alternative	Single Family Homes	Businesses
NOV 01	Alternative 2	1	0
	Alternative 3	1	0
NOV 02	Alternative 2	0	0
	Alternative 3	1	0
NOV 05	Alternative 2	0	0
	Alternative 3	1	0
NOV 06	Alternative 2	27	4
	Alternative 3	2	1
NOV 07	Alternative 2	0	0
	Alternative 3	6	0
NOV 08	Alternative 2	0	0
	Alternative 3	0	0
NOV 09	Alternative 2	10	0
	Alternative 3	12	0
NOV 10	Alternative 2	7	2
	Alternative 3	10	2
NOV 11	Alternative 2	20	0
	Alternative 3	38	0
NOV 12	Alternative 2	43	1
	Alternative 3	63	3
NOV 13	Alternative 2	0	0
	Alternative 3	0	0
NOV 14	Alternative 2	0	0
	Alternative 3	0	0
NOV 15	Alternative 2	6	0
	Alternative 3	6	4
NOV 16	Alternative 2	5	0
	Alternative 3	0	0
Total	**Alternative 2**	**119**	**7**
	Alternative 3	**140**	**10**

Source: Satellite Imagery provided by Google Earth (2010).

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.152 Impacts from the implementation of Alternative 3 would be similar to those described for Alternative 2; however, 10 businesses would be purchased and removed from the project corridor (see Table 6-16).

PUBLIC SERVICES AND FACILITIES

Alternative 1: No Action Alternative

6.153 Under the No Action Alternative, it is anticipated that community facilities and services would continue to be improved and renovated. As residents return to the storm damaged areas, schools, and health care and recreational facilities would be rebuilt. City services would improve through time, and fire and police facilities would be renovated and these services would move from temporary to permanent facilities. Much of the renovation and improvement to community

services have been completed by volunteer organizations, and it is likely that volunteers would continue to be an important part of future redevelopment.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.154 Short-term impacts from the TSP would occur on emergency services and access to public facilities. Emergency vehicle response times may increase during construction, and traffic congestion may cause temporary disruption of emergency vehicle access in the NOV project area. However, emergency vehicles would still be able to access the residents in the project area. Low-income non-drivers may be highly dependent on a particular walking path or transit route that could be interrupted during construction, thereby causing a short-term, temporary impact on access to public services.

6.155 Additional flood risk reduction could encourage more people and businesses to move into the area, which would increase the need for public services and facilities in the short-term (*e.g.*, during construction with increased construction personnel) and the long-term (*e.g.*, increased businesses and employment opportunities). The reduced flood risk would result in beneficial permanent impacts on public facilities and services because communication systems would be able to withstand foreseeable storm surges and hurricanes.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.156 Impacts on Public Services and Facilities from Alternative 3 would be similar to those described for Alternative 2.

POPULATION

Alternative 1: No Action Alternative

6.157 The population of Plaquemines Parish would remain the same or decrease under the No Action Alternative. Individuals may not rebuild their homes or move back to the area if the levees are not restored.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.158 Although 119 homes and individuals or families would be displaced under the TSP, owners would be offered fair market value for their land. Relocation assistance would be provided. This would enable them to relocate, possibly within the parish. Alternative 2 could have a positive impact on the population of Plaquemines Parish and the Census Block Groups that would be affected, as individuals may be more likely to stay, and other individuals may move back to the severely damaged parish if the levees are restored and the risk of flooding is reduced.

6.159 Levee construction would cause a temporary increase in population in the short-term. Long-term employment opportunities would exist following construction completion due to increased development in the area with the new flood protection. Therefore, in the long-term, the TSP would increase population in the area.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.160 Although there are 21 additional homes and individuals beyond those displaced under Alternative 2, impacts on population in the parish and the likelihood of people returning to or

newly occupying the Census Block Groups would be similar to those discussed for Alternative 2. Temporary increases in population during construction, and long-term increases in population due to increased business in the area, would be similar to those described for Alternative 2.

COMMUNITY AND REGIONAL GROWTH

Alternative 1: No Action Alternative

6.161 Under the No Action Alternative, the levees and floodgates would not be restored which would not aid the hurricane-damaged parish in recovery or support the parish in community or regional growth. Businesses and individuals may not relocate back to the parish if the levee system is not restored.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.162 Community and regional growth would improve with the implementation of Alternative 2 during construction because money would be spent on supplies, materials, and other expenditures in the area. Businesses and individuals would be more likely to return to the parish and the areas surrounding the back levees and MRL levees if flood risk is reduced.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.163 Impacts on community and regional growth would be increased under Alternative 3 as compared to Alternative 2, because of increased flood risk reduction.

HOUSING AND DISPLACEMENT OF PEOPLE

Alternative 1: No Action Alternative

6.164 Houses in the project area would continue to be exposed to inherent flood risks without the restored NOV levee system. Individuals could be displaced if large storm events occur in the project area or large hurricane events cause breaching or over-topping of the levees.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.165 No homes or businesses would be displaced for reaches NOV 08, 13 or 14. Under Alternative 2, 119 homes and seven businesses would be displaced in the remaining NOV sections (see Table 6-17). The total number of homes in the Census Block Groups is 14,972; the TSP would displace less than 1% of the homes in the area (0.79%). Increased flood risk reduction would decrease the chance of future storm-related displacement of individuals.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.166 No homes or businesses would be displaced for reaches NOV 08, 13 or 14. Under Alternative 3, 140 homes and 10 businesses would be displaced in the remaining sections (see Table 6-17). The City Price Baptist Church is located at 24963 Diamond Avenue in Port Sulphur near NOV 06 and would not be displaced by the Proposed Action. The implementation of Alternative 3 would displace approximately 1% of the total residences in the Census Block Groups in the NOV project area (0.94%). Additional risk reduction would further decrease the chance of future storm-related displacement of individuals beyond that described for Alternative 2.

COMMUNITY COHESION

Alternative 1: No Action Alternative

6.167 Community cohesion in the parish and in the project area, in particular, has already been affected with the hurricanes of 2005 and 2008. Homes were destroyed and families were forced to evacuate and relocate to other cities and possibly other states. Furthermore, indirect impacts on community cohesion resulted from the displacement of people due to the lack of jobs in the area. Although community cohesion may be currently lacking or reduced, the already-built and soon-to-be-built community centers across the parish will aid the area in rebuilding their social, religious, and community cohesion.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.168 With the implementation of the TSP, impacts on community cohesion would be expected to be adverse or neutral. Elevated noise levels from construction and associated traffic would have minor adverse or neutral effects on community cohesion in the vicinity of the project area because individuals may not spend time outdoors interacting with others in their neighborhood due to the noise. Access to local institutions such as houses of worship and civic organizations may be temporarily impaired, weakening community cohesion. Access to schools and shopping may be inhibited during construction, which may cause short-term, negligible impacts on community cohesion in the project area. Community cohesion may be temporarily, indirectly impacted with the displacement of people and/or businesses during construction. In the long-term, if persons or businesses are relocated, there could be indirect, minor permanent impacts on community cohesion.

6.169 However, in the long-term, there would be beneficial permanent impacts on community cohesion through the reduction of flood risk afforded to the individuals in the area. Individuals' homes, churches, and community centers would be better protected, which would allow for increased community cohesion.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.170 Impacts on community cohesion would be expected to be similar to those described for Alternative 2. However, there would be greater reduction in flood risk than provided in Alternative 2, so long-term benefits on community cohesion would be increased.

ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

Alternative 1: No Action Alternative

6.171 Under the No Action Alternative, the levees and floodgates would not be restored, which would not aid the hurricane-damaged parish in recovery or support the parish in community or regional growth. The entire population in the NOV project corridor, to include minority, low-income and young and elderly populations, would not have a reduced flood risk.

Alternative 2 (TSP): 50-year (2%) Level of Risk Reduction

6.172 Flood risk reduction benefits everyone equally regardless of age, race, or income level. The existing levee alignment would not be changed; therefore, no changes to the number of persons with improved flood risk reduction would occur.

6.173 With the implementation of the TSP, disproportionate impacts on minorities and low-income families would be expected to be adverse or neutral. Because the majority of the NOV levee project corridor is considered to be an area subject to disproportionate affects on minorities and low-income populations, there would likely be short-term moderate disproportionate impacts on the population in the project area. Transportation for individuals without vehicles could be temporarily impacted during levee construction. If minority or low-income individuals' homes are purchased or displaced and they have to relocate, this could cause permanent, major disproportionate impacts on low-income or minority populations.

Alternative 3: Authorized Pre-Katrina (GDM) Level of Risk Reduction

6.174 Impacts on low-income, minority populations, children or elderly persons, would be expected to be similar to those described for Alternative 2. However, the temporary disproportionate impacts on minorities, low-income families, and old and young persons would be at a greater magnitude due to longer construction durations and a larger project footprint.

Government-Furnished Borrow

ANALYSIS ASSUMPTIONS

6.175 Information for the discussion of potential GF borrow impacts is taken from IERs 18, 22, 25, and 28. These documents analyze the impacts of the actual borrowing only and do not address staging areas or access routes from borrow locations to staging areas near construction sites. An analysis of potential impacts from staging areas and access routes for the NOV project was presented previously in Sections 4 and 6 of this SEIS, and a transportation analysis of routes from borrow areas to the identified staging areas is presented in Section 6. More detailed information, including existing environmental conditions, and a detailed analysis of possible socioeconomic impacts are available in IERs 18, 22, 25, and 28, which are posted online at www.nolaenvironmental.gov.

6.176 Mitigation for borrow impacts is proposed in the Mitigation Plan (Appendix F).

6.177 If GF sites are available, it is not presently known which GF sites would be utilized or the acreages of borrow taken from the potential sites. Impacts presented below represent the potential GF sites described within IERs 18, 22, 25, and 28.

Wetlands

6.178 The jurisdictional wetland habitat types in the proposed borrow areas may include pasture wetlands and cypress swamps. The jurisdictional wetlands contain hydrophytic vegetation, hydric soils, and hydrology indicators. Pasture wetlands are comprised of soft rushes, flat sedges, smartweed, alligator weed, and other wetland grasses. Cypress swamp areas are dominated by bald cypress and tupelo gum. The jurisdictional BLH tree species include hackberry, Chinese tallow tree, pecan, American elm, live oak, water oak, green ash, bald cypress, black willow, box elder, and red maple. During initial investigations, a jurisdictional wetland determination from the CEMVN Regulatory Branch was completed for each potential borrow area. At this time, the USACE plans to avoid impacts on CWA Section 404

jurisdictional wetlands associated with providing borrow material for authorized hurricane protection construction.

6.179 With use of the proposed GF borrow sources, no direct or indirect impact on jurisdictional wetlands at the proposed borrow areas would occur. The jurisdictional wetland areas determined by the jurisdictional wetland determination provided by the Regulatory Branch would be avoided.

BLH

6.180 Nonjurisdictional BLH forests are comprised of dominant species such as hackberry, Chinese tallow tree, pecan, American elm, live oak, water oak, green ash, bald cypress, black willow, box elder, and red maple. Some understory species include dewberry, elderberry, ragweed, Virginia creeper, and poison ivy. A variety of birds utilize these hardwoods for nesting, breeding, brooding, and as perches. Hard mast (nuts) and soft mast (samaras, berries) provide a valuable nutritional food source for birds, mammals, and other wildlife species. Nonjurisdictional bottom-land hardwood forests lack one or more of the following criteria to be considered a CWA Section 404 jurisdictional wetland: hydrophytic vegetation, hydric soils, and/or wetland hydrology. Man-made ditches, canals, and/or pumping stations are present at some of the proposed borrow areas.

6.181 With use of the proposed GF borrow sources, there may be direct and indirect impacts on BLH forests. Mature trees would be cut down with the use of chainsaws or pushed down with bull dozers and excavators. Saw logs could be sold to the mill and younger trees could be processed into pulp wood for paper products. Woody debris remaining would be cleaned up and all berms would be leveled to eliminate hydrologic impacts. Once excavated, the area would no longer be viable for silviculture practices and some wildlife habitat would be lost. The area would be converted to ponds and small lakes if water is retained, or by vegetation and woody plants if water is not retained. It is expected that either type of area would attract a variety of wildlife including birds, reptiles, amphibians, and small mammals.

6.182 Table 6-17 presents the combined impacts to BLH from excavation of the GF borrow locations described in IERs 18, 22, 25, and 28. The collective impacts include total of 1,658.04 acres and 608.66 AAHUs of nonjurisdictional BLH.

Table 6-17. GF Borrow BLH Impacts

Proposed Borrow Site	Parish	BLH Impacted (Acres)	AAHUs Needed (Acres)
Churchill Farms, Pit A	Jefferson	29.9	10.62
West Bank E – Phase 1	Jefferson	25.1	13.1
West Bank E – Phase 2	Jefferson	53.2	27.8
West Bank F	Jefferson	148	85
West Bank I	Jefferson	9.76	4.64
Cummings North	Orleans	182	54.14
Maynard	Orleans	44	14.65
Stumpf – Phase 1	Orleans	318	88
Stumpf – Phase 2	Orleans	519	143

Table 6-17, continued

Proposed Borrow Site	Parish	BLH Impacted (Acres)	AAHUs Needed (Acres)
West Bank G	Orleans	82	45.52
Bazile	Plaquemines	11.6	3.93
Belle Chasse NAS	Plaquemines	8	3.68
Brad Buras	Plaquemines	(9, non-BLH)	0
Tabony	Plaquemines	86.93	28.9
Tac Carrere	Plaquemines	17.1	12.1
Triumph East	Plaquemines	0	0
West Bank N	Plaquemines	0	0
910 Bayou Road	St. Bernard	0	0
1418/1420 Bayou Road	St. Bernard	13	6.2
1572 Bayou Road	St. Bernard	3.7	1.79
4001 Florissant	St. Bernard	0	0
Dockville	St. Bernard	98.7	61.24
Johnson/Crovetto	St. Bernard	8.05	4.35
Bonnet Carre North – Phase 2	St. Charles	0	0
Bonne Carre South	St. Charles	0	0
Total		**1,658.04**	**608.66**

6.183 Mitigation for unavoidable BLH impacts associated with the GF borrow locations described in IERs 18, 22, 25, and 28 are addressed in Appendix F. The USACE has partnered with Federal and state resource agencies to form an interagency mitigation team that is working to assess and verify these impacts and to look for potential mitigation sites in the appropriate hydrologic basin. This effort is occurring concurrently with the planning process in an effort to complete mitigation work and construct mitigation projects expeditiously.

Non-Wetland Resources/Upland Resources

6.184 Some species identified in the non-wet pasture areas include Johnson grass (*Sorghum halepense*), yellow bristlegrass (*Setaria pumila*), annual sumpweed (*Cyclachaena xanthifolia*), arrow-leaf sida (*Sida rhombifolia*), Vasey grass, and Brazilian vervain (*Verbena brasiliensis*). The scrub/shrub areas are comprised of Chinese tallow tree, eastern false-willow (*Baccharis halimifolia*), wax myrtle, giant ragweed (*Ambrosia trifida*), dewberry (*Rubus flagellaris*), elderberry (*Sambucus canadensis*), red mulberry (*Morus rubra*), peppervine (*Ampelopsis arborea*), and dog-fennel (*Anthemis cotula*).

6.185 With use of the proposed GF borrow sources, direct impacts on non-wetland resources/upland resources would occur from clearing and excavation. Some indirect effects are expected from water accumulating and creating ponds and small lakes. The pasture areas would no longer provide grasses for herbivores such as deer, rabbits, and cattle. Some scrub/shrub areas may develop around the borrow area perimeters in time. Borrow areas that remain dry would be expected to be colonized by vegetation and woody plants which could offset some habitat loss.

Prime and Unique Farmland

6.186 Use of the proposed GF borrow sources may impact a total of 908.60 acres of prime and unique farmland. The proposed borrow areas would be cleared and excavated. Removing soils from these proposed borrow areas would result in a direct permanent loss of prime and unique farmlands, and the areas would no longer be available for farming. Indirect effects from construction would be from the proposed borrow areas filling with water and converting to ponds or small lakes. Borrow areas that do not retain water would probably not be able to produce food and fiber crops. The land would no longer provide grasses for herbivores such as deer, rabbits, or cattle.

Fisheries

6.187 There are no known fisheries resources at the proposed GF borrow sites.

Wildlife

6.188 The collective study areas comprising the proposed GF borrow sources contain a great variety of mammals, birds, reptiles, and amphibians. Species inhabiting the area include nutria, muskrat, mink, otter, raccoon, white-tailed deer, skunks, rabbits, squirrels, armadillos, and a variety of smaller mammals. Wood ducks (*Aix sponsa*) and some migratory waterfowl may be present during winter. Nongame wading birds, shorebirds, and sea birds including egrets, ibis, herons, sandpipers, willets, black-necked stilts, gulls, terns, skimmers, grebes, loons, cormorants, and white and brown pelicans are found in the project vicinity. Various raptors such as barred owls, red-shouldered hawks, northern harriers (marsh hawks), American kestrel, and red-tailed hawks may be present. Passerine birds in the areas include sparrows, vireos, warblers, mockingbirds, grackles, red-winged blackbirds, wrens, blue jays, cardinals, and crows. Many of these birds are present primarily during periods of spring and fall migrations. The areas may also provide habitat for the American alligator, salamanders, toads, frogs, turtles, and several species of poisonous and non-poisonous snakes.

6.189 With use of the proposed GF borrow sources, direct impacts from wildlife displacement may occur when the areas are excavated. The areas may be converted to ponds and small lakes. Aquatic vegetation may colonize the shallow littoral edge of the areas, and wildlife (otters, alligators, raccoons, wading birds, and ducks) adapted to an aquatic environment would be expected to expand their range into the new water bodies. A variety of plant species may colonize adjacent to the water that could provide important wildlife habitat utilized for nesting, feeding, and cover. Any areas that remain dry would be expected to be colonized by vegetation and woody plants, which could offset some habitat loss. The dense vegetation could attract a variety of wildlife including birds, reptiles, amphibians, and small mammals. Bald eagle nests have been noted in the vicinity of several GF borrow areas. Construction contractors would be prohibited from conducting any activity during eagle nesting months within a zone of 660 feet from the nest so as to avoid impacting the eagle nest during nesting months.

T&E Species

6.190 Use of the proposed GF borrow sources is not likely to adversely affect T&E species or their critical habitats. The endangered brown pelican may be present in the vicinity of some borrow locations. However, none were observed at the borrow areas described in this document.

The USFWS concurred with the USACE that excavation of the proposed borrow areas would not be likely to adversely affect the brown pelican or other T&E species, or their critical habitat.

Cultural Resources

6.191 The GF borrow locations were investigated for the presence of significant cultural resources through a variety of methods. The level of investigation varied depending on the probability of cultural resources being located within the project area. Investigations were geared toward identifying known and previously unrecorded historic properties within potential borrow areas and the APE. Background research involving review of known resources within the area, investigating informant reports of cultural resources, and assessing the likelihood of cultural resources based on soil and geomorphologic data were completed for all proposed borrow areas. Investigations included literature searches and reconnaissance surveys and Phase I cultural resource surveys.

6.192 With implementation of the use of the potential GF borrow sources, no known significant cultural resources would be impacted because they would be buffered and avoided. Consultation included correspondence with the SHPO and Native American Indian tribes that have an interest in the region. Taken together, the results of these investigations revealed that no known sites eligible for listing on or listed on the NRHP properties within the potential GF borrow areas would be affected by the proposed borrow excavation. In the unlikely event that cultural resources are identified during borrow excavation then work in the vicinity would cease. The USACE would consult with the Louisiana SHPO and Indian tribes pursuant to 36 CFR §800.13 to resolve adverse affects to a cultural resource.

Air Quality

6.193 With use of the potential GF borrow sources, there would be short duration impacts on air quality that would result from the construction of borrow areas. These impacts would be controlled by proper BMPs. Air quality impacts would be limited to those produced by heavy equipment and suspended dust particles could be generated by bulldozing, dumping, and grading operations. The construction equipment and haul trucks should have catalytic converters and mufflers to reduce exhaust emissions. The construction equipment should have the same emissions as local traffic in the areas. Dust suppression methods would be implemented to minimize dust emissions. Air emissions from the borrow excavation would be temporary and should not significantly impair air quality in the region.

Water Quality

6.194 Despite the use of BMPs, with borrow excavation there would be some disturbances to water quality in the immediate vicinity of the borrow areas. The contractor would be required to secure all proper local, state, and Federal permits required for potentially impacting water quality. The CEMVN requires that construction BMPs be implemented and followed during the construction phase. Silt fencing and hay bales would be installed around the perimeter of the proposed borrow areas to control runoff. To make optimal use of available material, excavation would begin at one end of the borrow area and be made continuous across the width of the areas to the required borrow depths, to provide surface drainage to the low side of the borrow pit as excavation proceeds. Excavation for semi-compacted fill would not be permitted in water nor shall excavated material be scraped, dragged, or otherwise moved through water. In some cases

the borrow areas may need to be drained with the use of a sump pump. Upon abandonment, site restoration would include placing the stockpiled overburden back into the pit and grading the slopes to the specified cross-section figures. Abrupt changes in grade shall be avoided, and the bottom of the borrow pit shall be left relatively smooth and sloped from one end to the other. Any excavation below the depths and slopes specified shall be backfilled to the specified permissible excavation line in accordance with construction plans and specifications. Abrupt changes in borrow area alignment shall be avoided. With the use of BMPs, direct and indirect disturbance of water quality would be temporary, confined, and short lived.

Noise

6.195 With use of the potential GF borrow sources there would be adverse noise impacts, especially on residences in the vicinity of borrow sites, occurring as a result of the excavation of borrow material. Noise would be created from high-powered machinery and human activities within the project ROW and emanate various distances beyond the construction site until the noise energy dissipates. Many of the proposed borrow areas are located in relatively sparsely populated areas; the number of residences and commercial properties exposed to the adverse impacts of noise is minimal. There is greater potential, however, for noise impacts to be generated by construction vehicles and personal vehicles for contract laborers that may require the use of public roads and highways for access to construction sites. However, these impacts would only be present during the excavation period. No permanent impacts are expected.

Transportation

6.196 Construction equipment such as bulldozers and excavators would need to be delivered, and haul trucks would be entering and exiting the sites on a daily basis during the period of excavation. The truck hauling would temporarily impede vehicle traffic and result in a minimal capacity on some local road segments. Flagmen, signage, cones, barricades, and detours would be used where required to facilitate the movement of heavy equipment and local traffic on affected road segments. The proposed design of all areas would require methods to avoid exposure of adjacent traffic routes and other urban developments. Appropriate measures to ensure safety and facilitate the movement of traffic would be implemented at all approved borrow areas. Appropriate measures to ensure safety and facilitate the movement of traffic would be implemented at all potential borrow areas. The current traffic volume at these areas is unknown.

6.197 IERs discuss the likely access routes into each borrow location. CEMVN has published an analysis of the effects on transportation from construction of the HSDRRS. The report provides estimates on the numbers of truck loads necessary to complete construction of the HSDRRS and the effects of transporting these materials. A transportation analysis for use of borrow for the restoration of the NOV levees based on the methodology from this report was previously presented in Section 6 of this document.

HTRW

6.198 An ASTM E 1527-05 Phase I ESA was completed for the proposed GF borrow areas. The Phase I ESA documented the RECs for the proposed project areas. If a REC cannot be avoided due to the confirmed presence or absence of contaminants actions to avoid possible contaminants would be required. Federal, state, or local coordination may be required. Because

the USACE plans to avoid RECs, the probability of encountering HTRW in the borrow areas is low. Copies of these reports are available online at www.nolaenvironemtal.gov.

Contractor-Furnished Borrow

ANALYSIS ASSUMPTIONS

6.199 Borrow material is normally GF which is acquired by the government from a willing landowner through a real estate transaction. However, alternative methods of securing borrow can be utilized when found to be in the best interest of government. If a borrow analysis is undertaken for a particular contract and it is determined to be in the best interest of the government to require the construction contractor to furnish its own borrow material then CF borrow would be considered.

6.200 Information for the discussion of potential borrow impacts is taken from IERs 19, 23, 26, 29, 30, 31, and 32. These documents analyze the impacts of the actual borrowing only, and do not address staging areas or access routes from borrow locations to staging areas near construction sites. An analysis of potential impacts from staging areas and access routes for the NOV project was presented previously in Sections 4 and 6 of this SEIS, and a transportation analysis of routes from CF borrow areas to the identified staging areas was presented previously in Section 6. More detailed information, including borrow alternatives, existing environmental conditions, and a detailed analysis of possible socioeconomic impacts, are available in IERs 19, 23, 26, 29, 30, 31, and 32, which are posted online at www.nolaenvironmental.gov.

6.201 Geotechnical evaluations have not been completed for potential borrow areas. Final selection and/or footprints of borrow areas could vary based on these evaluations. Borrow area footprints would be decreased in the case of negative geotechnical findings; areas not included in this investigation would require additional NEPA documentation.

6.202 It is not known whether any of these CF borrow sites would be utilized nor the acreages of borrow taken from those sites. Impacts presented below represent all of the potential CF sites described within IERs 19, 23, 26, 29, 30, 31, and 32.

Wetlands

6.203 During initial investigations, a jurisdictional wetland determination from the CEMVN Regulatory Functions Branch was completed for each borrow site that is addressed in the above-referenced IERs. However, the contractor is not obligated to utilize a listed site. Rather, the contractor may opt to propose an alternative borrow source, provided the contractor can demonstrate that the material is geotechnically suitable and that the site is not of cultural or environmental significance and is free of HTRW contamination. For IER sites with jurisdictional wetlands, it was determined that the sites would be avoided unless the landowner would acquire a Section 404 permit from the CEMVN Regulatory Functions Branch. Furthermore, for a permit to be issued there had to be a demonstrated purpose and need for the wetland impacts that were completely unrelated to the taking of borrow material for the purpose of supplying the material to a contractor or directly to a risk reduction project. If a permit was issued for a site with jurisdictional wetlands and as a condition of that permit the removal of

material from the site was a permitted activity and it was determined by CEMVN that the use of the material for government levee construction was solely ancillary to the permitted activity, then the action of using the material for government levee construction was considered to be in the Federal government's and public's best interest. Mitigation for any wetland impacts associated with the action permitted by CEMVN Regulatory Functions Branch would be required to be implemented by the Section 404 applicant prior to any materials being transported to a Federal risk reduction work site or utilized by any contractor working under a Federal risk reduction contract.

6.204 The River Birch Phase 1 area was identified as having 0.3 acre of jurisdictional wetlands that would be mitigated for by the landowner as required in its Section 404 permit. All mitigation would occur prior to the acquisition of any levee material by a contractor. The Eastover proposed borrow area contains ponds that are classified as jurisdictional other waters; however, CEMVN determined that the area can be excavated without a Section 404 permit and no mitigation would be required. The DK Aggregates site initially proposed was 85.5 acres in size and was determined to have 27 acres of jurisdictional wetlands, and some Section 404 jurisdictional other waters present. The proposed area described to be excavated for borrow use is 58.5 acres in size and is located in the non-wetland areas. Part of the St. Gabriel Redevelopment site is jurisdictional wetland. The area described to be excavated for borrow use is 122.6 acres in size and is located in the non-wetland areas. The landowners for both of these sites were made aware that no impacts to the wetlands can occur as results of his actions related to the taking of borrow material.

BLH

6.205 Non-jurisdictional BLH forests are comprised of dominant species such as hackberry, Chinese tallow tree, pecan, American elm, live oak, water oak, green ash, bald cypress, black willow, box elder, and red maple. Some understory species include dewberry, elderberry, ragweed, Virginia creeper, and poison ivy. A variety of birds utilize these hardwoods for nesting, breeding, brooding, and as perches. Hard mast (nuts) and soft mast (samaras, berries) provide a valuable nutritional food source for birds, mammals, and other wildlife species. Non-jurisdictional BLH forests lack one or more of the following criteria to be considered a Clean Water Act Section 404 jurisdictional wetland: hydrophytic vegetation, hydric soils, and/or wetland hydrology. Man-made ditches, canals, and/or pumping stations are present at some of the proposed borrow areas.

6.206 Mitigation for unavoidable BLH impacts would be the responsibility of the landowner. Proof of mitigation for non-jurisdictional BLH impacts would be supplied to the USACE prior to excavation activities. If these sites are used as CF borrow areas and mitigation is completed by the landowner(s), the landowner's mitigation would be discussed in subsequent NEPA documentation.

- The River Birch Phase 2 area was identified as having 6.4 acres of BLH present that was mitigated for by the landowner as required in its Section 404 permit. The landowner already has a Section 404 permit for construction of a landfill; borrow construction would be a secondary use of the site. All non-jurisdictional BLH forest impacts were assessed by the USFWS and CEMVN under NEPA, Fish and Wildlife Coordination Act, and

under Section 906 (b) WRDA 1986 requirements and mitigation for those impacts would be completed. The Section 404 permit indicates that wetland impacts would be mitigated for prior to acquisition of material for a storm risk reduction project.

- The potential Kimble #2 borrow area would impact 5.4 acres of BLH. The landowner would be required to complete mitigation for the loss of 5.4 acres of BLH prior to excavation activities if the site is selected by a construction contractor.

- Excavation of the potential Eastover Phase II borrow area would directly impact approximately 31.1 acres of non-jurisdictional BLH. The landowner would be required to complete mitigation for the loss of 31.1 acres of non-jurisdictional BLH prior to excavation activities if the site is selected by a construction contractor.

- Excavation of the potential Willow Bend Phase II CF borrow area would directly impact approximately 76.2 acres of non-jurisdictional BLH. The landowner would complete mitigation prior to excavation activities for the loss of 76.2 acres of non-jurisdictional BLH if the site is selected by a construction contractor.

- Excavation of the potential Contreras Dirt (Cells E, F, and Z) CF borrow area would directly impact 225 acres of non-jurisdictional BLH. The landowner would complete mitigation prior to excavation activities for the loss of 225 acres of non-jurisdictional BLH if the site is selected by a construction contractor.

- Excavation of the potential Acosta 2, Idlewild Stage 2, Lilly Bayou, Port Bienville, Raceland Raw Sugars, Scarsdale, and Spoil Area CF borrow areas would directly impact 965.30 acres of non-jurisdictional BLH. The landowners of these potential CF borrow areas would complete mitigation prior to excavation activities for the loss of non-jurisdictional BLH if their sites are used for construction. Excavation of the Nairn and 3C Riverside Phase 3 CF borrow areas would directly impact 195.1 acres of non-jurisdictional BLH. The landowner's recent clearing of the potential 3C Riverside Phase 3 site contributed to the direct impact on non-jurisdictional BLH in the project area. Because the site was cleared in anticipation of the Proposed Action, the landowner would complete mitigation prior to excavation activities for the loss of non-jurisdictional BLH if their site is used for construction.

Non-Wetland Resources/Upland Resources

6.207 Some species identified in the non-wet pasture areas include Johnson grass, yellow bristle grass, annual sumpweed, arrow-leaf sida, vasey grass, and Brazilian vervain. The scrub/shrub areas are comprised of Chinese tallow tree, eastern false-willow, wax myrtle, giant ragweed, dew berry, elderberry, red mulberry, pepper vine, and dog-fennel.

6.208 With use of the potential borrow sources, direct impacts on non-wetland resources/upland resources would occur from clearing and excavation. Some indirect effects are expected from water accumulating and creating ponds and small lakes. The pasture areas would no longer provide grasses for herbivores such as deer, rabbits, and cattle. Some scrub/shrub areas may

develop around the borrow area perimeters in time. Borrow areas that remain dry would be expected to be colonized by vegetation and woody plants, which could offset some habitat loss.

Navigable Waters

6.209 The Mississippi River, GIWW, IHNC, and other navigable waterways are in the vicinity of the risk reduction projects. The waterways and associated locks may be utilized for shipping borrow material from sites outside of the New Orleans metropolitan area. Borrow material from the potential borrow areas would be transported via barge to construction sites, causing an increase in waterway traffic. The loading and unloading of material from these areas, and associated roads leading to these areas, are undetermined and could potentially impact navigable waters.

Prime and Unique Farmland

6.210 Use of the potential CF borrow sources may impact a combined total of 1,353.90 acres of prime and unique farmland. The borrow areas would be cleared and excavated. Removing soils from these borrow areas would result in a direct permanent loss of prime and unique farmlands, and the areas would no longer be available for farming. Indirect effects from construction would be from the potential borrow areas filling with water and converting to ponds or small lakes. Borrow areas that do not retain water would probably not be able to produce food and fiber crops. The land would no longer provide grasses for herbivores such as deer, rabbits, or cattle.

Fisheries

6.211 The borrow area at Eastover contains ponds that were once golf course water traps. They do not support a viable fisheries system. The borrow areas at 1025 Florissant Hwy and Acosta contain small ponds. They do not support viable fisheries systems. There are no known fisheries resources at the other sites.

Wildlife

6.212 The collective study areas comprising the nonexclusive list of proposed CF borrow sources contain a great variety of mammals, birds, reptiles, and amphibians. Species inhabiting the area include nutria, muskrat, mink, otter, raccoon, white-tailed deer, skunks, rabbits, squirrels, armadillos, and a variety of smaller mammals. Wood ducks and some migratory waterfowl may be present during winter. Non-game wading birds, shore birds, and sea birds including egrets, ibis, herons, sandpipers, willets, black-necked stilts, gulls, terns, skimmers, grebes, loons, cormorants, and white and brown pelicans are found in the project vicinity. Various raptors such as barred owls, red-shouldered hawks, northern harriers (marsh hawks), American kestrel, and red-tailed hawks may be present. Passerine birds in the areas include sparrows, vireos, warblers, mockingbirds, grackles, red-winged blackbirds, wrens, blue jays, cardinals, and crows. Many of these birds are present primarily during periods of spring and fall migrations. The areas may also provide habitat for the American alligator, salamanders, toads, frogs, turtles, and several species of poisonous and nonpoisonous snakes.

6.213 With use of the borrow sources, direct impacts from wildlife displacement may occur when the areas are excavated. The areas may be converted to ponds and small lakes. Aquatic vegetation may colonize the shallow littoral edge of the areas, and wildlife (otters, alligators, raccoons, wading birds, and ducks) adapted to an aquatic environment would be expected to

expand their range into the new water bodies. A variety of plant species may colonize adjacent to the water that could provide important wildlife habitat utilized for nesting, feeding, and cover. Any areas that remain dry would be expected to be colonized by vegetation and woody plants, which could offset some habitat loss. The dense vegetation could attract a variety of wildlife including birds, reptiles, amphibians, and small mammals. Bald eagle nests have been noted in the vicinity of several proposed borrow areas. Construction contractors would be prohibited from conducting any activity during eagle nesting months within a zone of 660 feet from the nest so as to avoid impacting the eagle nest during nesting months.

T&E Species

6.214 There are no known T&E species, or critical habitats, in the vicinity of any of the potential CF borrow areas identified in the non-exclusive list. The Proposed Action is not likely to adversely affect these T&E species or their critical habitats. The USFWS concurred with the USACE that excavation of any potential borrow areas would not be likely to adversely affect T&E species or their critical habitat.

6.215 Regarding barge or rail transport of borrow material, the impacts on T&E species under this alternative are not known. The USACE would work with USFWS to avoid impacts on T&E species at any borrow areas proposed by a contractor. The USACE would work with USFWS and NMFS to avoid impacts on T&E species associated with the loading and unloading of material to navigable waters, if used.

Cultural Resources

6.216 The CF borrow locations that were previously evaluated in the above referenced IERs represent a non-exclusive list of potential CF borrow sources. The IER sites were investigated for the presence of significant cultural resources through a variety of methods. The level of investigation varied depending on the probability of cultural resources being located within the project area. Investigations were geared toward identifying known and previously unrecorded historic properties within potential borrow areas and the APE. Background research involving review of known resources within the area, investigating informant reports of cultural resources, and assessing the likelihood of cultural resources based on soil and geomorphologic data was completed for all proposed borrow areas. Investigations included literature searches, reconnaissance surveys, Phase I cultural resources surveys, and in some cases extensive subsurface testing.

- Merrick Cemetery was documented nearby the Gatien-Navy Ships property. The of the excavation of the Gatien-Navy Ships property on the neighboring Merrick Cemetery would be considered. In order to minimize cumulative impacts from erosion, a buffer zone between the cemetery and the excavation would remain in place. This plan was developed with coordination from the Louisiana SHPO.

- A cultural resources survey of the Willow Bend Phase II borrows area revealed the remains of two sugar mills (16SJB14 and 16SJB15) within the Willow Bend property. A 290-foot buffer zone that incorporates a 3:1 slope will be placed around 16SJB15 as a precautionary measure to avoid impacts on the site.

- Two historic properties (16SB164 and 16SB165) eligible for listing on the NRHP exists within the Contreras Dirt CF borrow area and could be affected by the proposed actions. However, measures would be taken to avoid impacts on these historic properties by placing a "no work area" buffer zone around each historic property. Consequently, the excavation of borrow material from these potential CF borrow areas would have no adverse effect on historic properties.

- A Phase I cultural resources assessment was performed on the Port Bienville CF borrow area and no NRHP-eligible cultural resources were identified. Concerns about the possibility of unrecorded burials within the borrow area were raised by the Jena Band of Choctaws and the Mississippi Band of Choctaws. A Memorandum of Agreement was signed between the Jena Band and the Mississippi Band of the Choctaw Indians as well as by M. Matt Durand of Port Bienville Clay Mine, L.L.C. outlining procedures to allow use of the borrow area and to care for unexpected discoveries should these occur.

- A Phase 1 cultural resources investigation within the Bocage CF borrow area identified two historic archaeological sites. These two sites, the Bocage Plantation Quarters Site (16AN82) and the structural remains of a historic period sugar mill, are considered by researchers to be eligible for listing on the NRHP. A 200-foot buffer zone that incorporates a 3:1 slope would be placed around site 16AN82 and the remains of the sugar mill as a precautionary measure to avoid impacts on these sites.

- A Phase I cultural resources survey of the Citrus Lands CF borrow area was conducted and recorded three new cultural loci associated with Woodland Plantation (16PL157). Two of these cultural resources loci were determined not to be eligible for the NRHP. One locus is potentially eligible for the NRHP and requires more testing before it can be disturbed. However a 328-foot buffer would be established around this resource and it would not be affected by any excavations of the borrow area. Previously recorded site 16PL153 exists near the border of the borrow area, but will not be affected because a 328-foot buffer zone would be established around the site.

- A Phase I cultural resources survey of the Conoco Phillips borrow area documented site 16PL165. This site would have a 328-foot buffer established around the site for protection.

- A Phase I cultural resources investigation was undertaken of the Plaquemine Dirt & Clay CF borrow area, and located three cultural resources loci associated with the Woodland Plantation (site 16PL157). These loci were determined to not be eligible for the NRHP. Previously recorded site 16PL153 is located at the edge of this property and on the border of the Citrus Lands borrow pit. This site would have a 328-ft buffer zone established to protect it from damages during excavation of the borrow property.

6.217 If a contractor opts to use a CF borrow source that has been previously evaluated in one of the above-referenced IERs, then no known significant cultural resources would be impacted because they would be buffered and avoided. Consultation included correspondence with the SHPO and Indian Tribes that have an interest in the region. Taken together, the results of these

investigations revealed that no known sites eligible for listing on or listed on the NRHP properties within the borrow areas would be affected by the proposed excavation. In the unlikely event that cultural resources are identified during borrow excavation, then work in the vicinity would cease. The USACE would consult with the Louisiana SHPO and Indian Tribes pursuant to 36 CFR § 800.13 to resolve adverse affects on a cultural resource.

Air Quality

6.218 If a contractor opts to use a CF borrow source that has been previously evaluated in one of the above-referenced IERs, then there would be short-term impacts on air quality that would result from the construction of borrow areas in Orleans, Jefferson, St. Bernard, and Plaquemines parishes, and Hancock County, MS controlled by proper BMPs. Air quality impacts would be limited to those produced by heavy equipment and suspended dust particles generated by bulldozing, dumping, and grading. Operation of construction equipment and support vehicles would generate VOCs, PM-10, PM-2.5, NO_x, CO, O_3, and SO_2 emissions from diesel engine combustion. The construction equipment and haul trucks should have catalytic converters and mufflers to reduce exhaust emissions. The construction equipment should have the same emissions as local traffic in the areas. Dust suppression methods would be implemented to minimize dust emissions. Air emissions from the Proposed Action would be temporary and should not significantly impair air quality in the region. Due to the short duration of the construction projects, any increases or impacts on ambient air quality are expected to be short-term and minor and are not expected to cause or contribute to a violation of Federal or state ambient air quality standards. Equipment used during excavation of the St. Gabriel Redevelopment area is not expected to exceed 100 tons per year of VOCs and nitrogen oxides. The air quality of Iberville Parish is not expected to be significantly impacted by this action.

Water Quality

6.219 If a contractor opts to use a CF borrow source that has been previously evaluated in one of the above reference IERs, then despite the use of BMPs, with implementation of the TSP there would be some disturbances to water quality in the immediate vicinity of these borrow areas. The contractor would be required to secure all proper local, state, and Federal permits required for potentially impacting water quality. The CEMVN requires that construction BMPs be implemented and followed during the construction phase. Silt fencing and hay bales would be installed around the perimeter of the proposed borrow areas to control runoff. To make optimal use of available material, excavation would begin at one end of the borrow area and be made continuous across the width of the areas to the required borrow depths, to provide surface drainage to the low side of the borrow pit as excavation proceeds. Excavation for semi-compacted fill would not be permitted in water nor shall excavated material be scraped, dragged, or otherwise moved through water. In some cases the borrow areas may need to be drained with the use of a sump pump.

6.220 Upon abandonment, site restoration would include placing the stockpiled overburden back into the pit and grading the slopes to the specified cross-section figures. Abrupt changes in grade shall be avoided, and the bottom of the borrow pit shall be left relatively smooth and sloped from one end to the other. Any excavation below the depths and slopes specified shall be addressed in accordance with construction plans and specifications. Abrupt changes in borrow area alignment shall be avoided. Disturbance of water quality would be temporary, confined,

and short-term. The River Birch Phase 1 and 2 sites received LDEQ Water Quality Certifications on 07 May 2004 and 28 June 2007, respectively. Regarding barge or rail transport of material, the impacts on water quality at borrow areas would be the same as the Proposed Alternative. However, the loading and unloading of material from these areas, and associated roads leading to these areas, are undetermined and could potentially impact water quality.

Noise

6.221 If a contractor opts to use a CF borrow source that has been previously evaluated in one of the above-referenced IERs, then some of the CF borrow sites are located near highways, interstates, and residential areas, while others are located in rural areas. Currently, sound levels would be expected to be minor to moderate. The primary producers of sound would be from traffic, people, and, wildlife. Local traffic may have short-term sound levels that are high. There would be an elevation of noise levels during the excavation of borrow. This noise would be associated with construction equipment such as bull dozers, excavators, haul trucks, and/ or chainsaws. Portable pumps would also be used if needed. Elevated noise levels may impact nearby residents. However, these impacts are expected to be short-term and constrained to construction hours.

Transportation

6.222 With implementation of the TSP, construction equipment such as bulldozers and excavators would need to be delivered, and haul trucks would be entering and exiting the sites on a daily basis during the period of excavation. The truck hauling would temporarily impede vehicle traffic and result in a minimal capacity on some local road segments. Flagmen, signage, cones, barricades, and detours would be used where required to facilitate the movement of heavy equipment and local traffic on affected road segments. The proposed design of all areas would require methods to avoid exposure of adjacent traffic routes and other urban developments. Appropriate measures to ensure safety and facilitate the movement of traffic would be implemented at all approved borrow areas as outlined in the construction contract. The current traffic volumes at these areas are unknown. Individual IERs discuss the likely access routes into each borrow location. CEMVN has published an analysis of the effects on transportation from construction of the HSDRRS. The report provides estimates on the numbers of truckloads necessary to complete construction of the HSDRRS and the effects of transporting these materials. A transportation analysis for use of borrow to be used for the NOV levees based upon the methodology used in the transportation report was included previously in Transportation section in Section 6 of this document.

HTRW

6.223 If a contractor opts to use a CF borrow source that has been previously evaluated in one of the above-referenced IERs, then an ASTM E 1527-05 Phase I ESA was completed for those borrow areas. The Phase I ESA documented the RECs for the proposed project areas. If a REC cannot be avoided due to the confirmed presence or absence of contaminants, actions to avoid possible contaminants would be taken. Federal, state, or local coordination may be required. Because the USACE plans to avoid RECs the probability of encountering HTRW in the borrow areas is low. Copies of these Phase I ESA reports are available online at www.nolaenvironmental.gov.

Cumulative Impacts

6.224 This section of the SEIS addresses the potential cumulative impacts associated with implementation of the TSP and other projects/programs that are planned for the study area. Cumulative Impacts (also sometimes termed Cumulative Effects) are defined 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). Cumulative Effects can result from individually minor but collectively significant actions taking place over a period of time. This section follows the guidance provided by the CEQ's *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997), and *Memorandum and Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005). An evaluation of other regionally similar actions or actions potentially resulting in adverse impacts or beneficial effects on similar regional resources that have occurred in the past, currently underway, or planned for the foreseeable future must, therefore, be considered.

6.225 Consideration of cumulative impacts has been long required under regulations of NEPA, but it is a difficult and evolving area of study because it requires (1) assessing effects over larger (*i.e.* regional) areas, (2) assessing effects over longer periods of time including the past and future, and (3) interpreting interactions among multiple, complex, and dynamic human activities. From the Chairman of the CEQ to the Heads of Federal Agencies (CEQ 2005), the CEQ made clear its interpretation that "…generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions…" and that the "…CEQ regulations do not require agencies to catalogue or exhaustively list and analyze all individual past actions."

METHODOLOGY OF CUMULATIVE IMPACTS ANALYSIS

6.226 Methods included a qualitative look at a discrete area and selected activities, past, present, and future, identified for that area. Preliminary analysis did not include assembling matrices or use of formal models. The NEPA Scoping activities from 2009 did not result in cumulative impacts becoming a key topic of interest. Activities are described (below) under major time categories of past, present, and future, along with comments on potential incremental and/or collective impacts on selected aspects of the "human environment" (40 CFR 1508.1, 1508.8) and with a focus on environmental consequences. For purposes of contrast among project planning alternatives, emphasis is placed on the project dimensions of the No Action versus the TSP. Other alternatives not addressed are similar enough that it is believed no substantial variations of cumulative impacts are missed.

GEOGRAPHIC AREA OF POTENTIAL EFFECTS FOR CUMULATIVE IMPACTS

6.227 The geographic area considered for cumulative impacts is Plaquemines Parish. The southern portions of Jefferson, Orleans, and St. Bernard parishes may also be included and considered because ingress and egress into Plaquemines Parish could be affected by projects in these parishes. The Barataria Basin, Breton Sound Basin, and Mississippi River Delta Basin are also considered for cumulative impacts.

CUMULATIVE IMPACTS IN THE PAST, PRESENT, AND FUTURE

6.228 This context of time is viewed to include projects or activities with origins or output within what might be termed the very recent past or immediate future. Many aspects of present-time conditions that potentially relate to cumulative impacts are described under the Affected Environment section of this project's SEIS. The present study (New Orleans to Venice) has links viewed as cumulative regarding several Federal projects. The following paragraphs discuss activities within the geographic area that may contribute to cumulative impacts.

6.229 Hurricane Katrina damaged several portions of the levee system and flooded most of the project area. After Hurricane Katrina, the USACE began restoring the HSDRRS. The restorations to risk reduction components included levees, floodwalls, gates, and pumping stations along a 217-mile-long system surrounding metropolitan New Orleans. There are several projects within the region that are associated with this risk reduction including the Plaquemines Parish Non-Federal Levees, Lake Pontchartrain and Vicinity, Larose to Golden Meadow, Morganza to the Gulf, Southeastern Louisiana Urban Flood Damage Reduction, and West Bank and Vicinity.

6.230 Impacts still evident from Hurricanes Katrina, Gustav, and Ike in the area include the degradation, damage, or destruction of homes, facilities, and recreational parks in the area. The rebuilding of homes, schools, churches, parks, businesses and other facilities in Plaquemines Parish and throughout the Gulf Coast are still ongoing and will likely be for the next 5 to 10 years. The Port Sulphur, Buras, and Boothville-Venice Community Centers, Buras Library, Buras Auditorium, Buras and Boothville-Venice Sewer Lift Stations, and the Point a La Hache Water Treatment Plant are just a few examples of the facilities being rebuilt within the project corridor.

6.231 CEMVN is also involved in other regional risk reduction and coastal restoration planning efforts. LCPR efforts involve comprehensive planning for protection and restoration for all coastal water resources. Within Barataria Basin, Breton Sound Basin, and Mississippi River Delta Basin there are 35 projects proposed or constructed under the CWPPRA, which are designed to restore, enhance or build marsh habitat and prevent erosion of marsh habitat. Projects involve numerous protection and restoration methods, including rock armored shoreline protection breakwaters, dredge material marsh construction, marsh terracing and planting, fresh water and sediment diversion projects, and modification or management of existing structures. Projects in the NOV project area include West Pointe a La Hache Marsh Creation, Spanish Pass Diversion, and Venice Ponds Marsh Creation.

6.232 The closure of the Mississippi River Gulf Outlet (MRGO), on 30 January 2009, at the Bayou La Loutre ridge stopped all maritime access (deep-draft and shallow-draft) in the MRGO to the Gulf of Mexico from the IHNC. The closure structure was constructed of rip-rap and built to an elevation of +5 ft NAVD (after settling), connecting the historic Bayou La Loutre ridgeline. Once completed, there would be no further access for maritime traffic between the Mississippi River, Breton Sound, and Gulf of Mexico to the eastern leg of the GIWW besides the IHNC lock. This action is expected to reduce the salinity levels in adjacent waterbodies. CEMVN is investigating large-scale habitat restoration of areas impacted by the MRGO, and includes coastal marshes, bayous and upland ridges between the GIWW and Breton Sound.

6.233 There are several transportation projects in the region that are either ongoing or proposed for the near future. Tidewater Road near Venice is proposed to be raised to prevent flooding. This project is vital because Venice services the seafood, oil and gas, marine vessel repair, and sport fishing industries. A new bypass road that connects Peters Road in Jefferson Parish with Walker Road in Plaquemines Parish including a bridge over the Intracoastal Waterway is proposed to begin construction. A project to replace the Belle Chasse Bridge and Tunnel is currently in the design phase. The Belle Chasse Highway is proposed to be expanded to six lanes from the Belle Chasse Bridge to Lapalco Boulevard. Construction is underway on the Harvey Boulevard Extension. This project involves a new bridge over the Algiers Outfall Canal to connect Harvey Boulevard in Jefferson Parish with Engineers Road in Plaquemines Parish. The widening of LA 23 to four lanes near Port Sulphur is currently under study. The Huey P. Long Bridge Widening in Jefferson Parish is currently in progress and estimated to be complete near the end of 2013. The new I-10 Twin Span Bridge across Lake Pontchartrain from New Orleans to Slidell is in progress and recently opened up to traffic. Only the eastbound lanes have been constructed. The construction of the westbound lanes will be starting soon. The old I-10 Twin Span Bridge will be demolished.

6.234 On 20 April 2010 the Deepwater Horizon drilling rig exploded in the Gulf of Mexico releasing over 200 million gallons of crude oil during a 3-month period. The spill caused extensive damage to marine and wildlife habitats, including wetlands, as well as the fishing and tourism industries in Plaquemines Parish. After the explosion and subsequent spill, the President issued a moratorium on deepwater oil and gas drilling in the Gulf of Mexico. Although the moratorium was lifted in October 2010, most of the deepwater rigs had left the Gulf of Mexico. These actions resulted in the loss of thousands of jobs that directly or indirectly were associated with the rigs (*e.g.,* drill rig employees, crew ships, hotel employees). Impacts are still being assessed as a result of the BP oil spill.

SUMMARY OF CUMULATIVE IMPACTS ANALYSIS

Wetland Resources

6.235 Cumulative impacts on wetlands, BLH, and aquatic habitats would be permanent and significant, primarily because nearly all risk reduction projects, and many transportation projects, cause the permanent loss of these habitats in southeast Louisiana. When combined with the high rate of wetland loss in coastal Louisiana exacerbated recently by the BP oil spill, the cumulative impacts would be long-term and would likely permanently alter these sensitive habitats. However, impacts on these habitats, including wetlands, would be mitigated by restoration or creation of wetlands, and this mitigation would be a component of all projects in the region, including transportation, construction, and risk reduction projects. It is anticipated that all Federal actions, like the NOV levee project, would be required to provide compensatory mitigation to ensure that no net loss of wetlands would occur, in compliance with EO 11988. However, even with mitigation in place, there would be a temporary cumulative loss of function of wetland and BLH forest habitats until such a time as the mitigation sites have achieved adequate wetland functions.

Water Quality, Fisheries, and EFH

6.236 The NOV project and multiple flood control projects ongoing in the region would have a potential for cumulative impacts on water quality, fisheries, and EFH resources. Projects such as

freshwater reintroduction from the Bonnet Carré spillway would likely improve water quality in the region and thereby increase productivity of fisheries as wetlands continue to recover. Silt curtains would be used to minimize the impacts of dredging and levee expansion. Additional temporary impairment from construction stormwater runoff would occur on water resources if there is a major rain event during construction of levee and floodwall reaches. The MRGO deauthorization closure structure, which would reduce salinities in Lake Borgne and Lake Pontchartrain, and other channel modification features, would contribute to significant beneficial cumulative effects on the large-scale EFH resources in the NOV project area. Minor cumulative impacts on water resources from the multiple CWPPRA projects within the NOV sub-basins would occur. NMFS mitigation planning would be implemented to minimize cumulative impacts on marine and aquatic species.

Terrestrial Resources

6.237 Most of the protected acreage between the MRL and the back levees has been developed for urban or agricultural uses. Major natural vegetative communities that remain include isolated areas of BLH forest and a few remnant drained marshes. Much of the levee forest which was cleared for agriculture and later abandoned is now a shrub/scrub or old field habitat characterized by highly tolerant species typical of disturbed areas, many of which are non-native species. Due to the already highly disturbed nature of the project area, cumulative impacts from construction activity and conversion of natural areas to levees and flood risk reduction features would be minor, but would include increased habitat fragmentation, alterations in hydrology, and continued degradation of habitat quality in the vicinity of the project area.

Socioeconomics and Environmental Justice

6.238 The proposed NOV restorations would add value for various purposes ranging from industrial, commercial, residential, institutional, and public immediately adjacent to the developments of Plaquemines Parish. The proposed structures would add to community and regional growth and recovery.

6.239 The NOV levee project in addition to the HSDRRS projects in the region would have cumulative beneficial impacts on socioeconomics. These projects would provide additional hurricane and storm risk reduction, reducing the threat of inundation of infrastructure due to severe tropical storm events. Hurricane and storm risk reduction benefits all residents, regardless of income or race, increases confidence, reduces insurance rates, and allows for development and redevelopment of existing urban areas. Short-term cumulative socioeconomic benefits are realized through the expenditure of over $14 billion in the region, which directly provides jobs, benefits businesses through the purchases of materials and supplies, and provides sales tax revenues to local governments. Providing risk reduction would aid in the recovery and creation of businesses and industries, employment and income in south Plaquemines Parish. The combination of the 50-year level of risk reduction in south Plaquemines Parish with the 100-year level of risk reduction for metropolitan New Orleans from the HSDRRS would cumulatively benefit residences and businesses through increased economic growth. Regionally, 100-year level of risk reduction is being provided for metropolitan New Orleans through HSDRRS. Under the TSP, there would only be a 50-year level of risk reduction; therefore, there would be adverse cumulative disproportionate impacts on low-income and minority communities within the project area, as their risk of flooding would be greater than the flood risk in the rest of the

region. Although Alternative 3 would provide higher levees in some areas, it does not provide a consistent level of risk reduction and would not guarantee an equal level of risk reduction for all people regionally, regardless of race or income level.

Cultural Resources

6.240 The landscape of the narrow strip of land between the Mississippi River and the marsh that comprises the NOV levee project area is the result of intensive modification through forest clearance, agriculture, fishing industry, oil, gas and sulfur extraction, residential occupation, supporting infrastructure, military installations, and flood control measures. Most cultural resources remaining in the project area are representative of the result of such activities and are susceptible to disturbances caused by present and future landscape modifications. Activities from redevelopment and transportation projects including the NOV levee project may result in cumulative adverse impacts on known or unknown cultural resources through further modification of this intensively used and occupied landscape, which may include erosion, resulting from alterations in hydrology and degradation in habitat quality discussed previously and any subsequent development which may occur in the area as a result of the reduced threat of storm-driven destruction.

6.241 The implementation of the NOV levee project and other flood risk reduction projects would also provide cumulative beneficial impacts to cultural resources through added storm-damage reduction. Additionally, the results of cultural resources investigations conducted on behalf of NOV levee related projects in compliance with NEPA and Section 106 regulations have recorded cultural resources sites in the NOV levee project area that may have otherwise remained unknown. Identification and evaluation of cultural resources in the project area provides an initial step toward preservation of these resources and contributing to the body of information pertaining to understanding the human past in the NOV levee project area. The present and subsequent cultural resources investigations in support of NOV levee-related projects and in compliance with NEPA and Section 106 regulations would improve upon the cultural resources knowledge base for the area and identification of sites where preservation measures should be implemented.

Transportation

6.242 The construction activities, transportation of large quantities of materials, and construction equipment would lead to an increase in traffic volume throughout the project area. The NOV levee project in conjunction with concurrent transportation projects, HSDRRS construction, and local redevelopment could increase wear-and-tear on vicinity roads, and would thus have short-term cumulative adverse impacts on transportation. The increased construction traffic could also cause temporary congestion and traffic delays and could also potentially increase traffic accidents and related traffic fatalities. The lower flood risk that would occur in Plaquemines Parish upon restoration, armoring, and accelerated completion of the NOV Federal levees may cause additional economic and population growth in the region and, thus, an increase in the demand for transportation resources would likely occur.

Noise

6.243 Noise emissions associated with the NOV would be short-term, lasting for the time required to complete the project. There would be no long-term noise emissions associated with

operation of the NOV system with the exception of periodic operation of the floodgates. The renovation of existing structures and new large-scale construction projects related to the recovery and redevelopment would add to the overall noise levels during the implementation of the NOV levees, but is not expected to have long-term cumulative impacts.

Air Quality

6.244 Air emissions associated with the NOV levee project would be short-term, lasting for the time required to complete the project. Once the NOV levee construction is completed, air emissions would be limited to the periodic operation of pumps and floodgates and from vehicles that maintenance workers use to maintain and administer the levee system. The air emissions associated with the long-term operation would be low, and the cumulative effects of NOV levees on the air quality in the project area would be insignificant and minor.

Mitigation

Wetland Resources

6.245 Mitigation for unavoidable wetland impacts as a result of the NOV levee alternatives and borrow excavation is described in a separate mitigation report prepared by CEMVK (Appendix F). CEMVK has partnered with Federal and state resource agencies to form an interagency mitigation team that is working to assess and verify these impacts, and to look for potential mitigation sites in the appropriate hydrologic basin. This effort is occurring concurrently with the SEIS planning process in an effort to complete mitigation planning and construct mitigation projects expeditiously.

6.246 Habitat boundaries were identified by field investigations, GIS software, 2007 USGS vegetation data, 2007 National Wetland Inventory data, and 2008 Digital Orthophoto Quarter Quads imagery. GRSC's analyses indicated that the implementation of the TSP would result in impacts on 409.52 habitat acres.

Aquatics

6.247 Approximately 212.76 acres of existing EFH intertidal marsh and open water bottoms would be permanently impacted; however, the CEMVK has committed to creating 134.25 WVA AAHUs of intermediate, brackish, and saline marsh in designated EFH open water areas to mitigate these acres.

Water Quality

6.248 Disturbed soils and hazardous substances from construction equipment (*i.e.*, anti-freeze, fuels, oils, lubricants) could directly impact water quality during construction activities. These effects would be minimized through the use of BMPs, including diversion dikes, vegetative buffer strips, seeding and mulching, hay bale dikes, silt fencing, vegetative cover, sediment basins, sediment curtains, and sediment traps. A General Stormwater Permit would be obtained prior to construction, and this would require approval of a site-specific SWPPP and NOI. A site-specific SPCCP would also be in place prior to the start of construction. BMPs outlined in these plans would reduce the potential for migration of soils, oil and grease, and construction debris through the local watersheds.

Wildlife

6.249 The potential for migratory birds to use the project area is high, as the adjacent marshes attract migratory birds, and nesting activity is common. If construction activity occurs between 1 February and 31 August, any migratory birds nesting within the project area could be affected. If construction activities begin during migration season, migratory bird surveys would be conducted.

6.250 If at any time throughout the implementation of this alternative it becomes apparent that the project has the potential to affect T&E species or their habitats, then consultation would be initiated with LDWF, USFWS, or NOAA Fisheries to minimize any impacts and to identify additional proposed mitigation.

Transportation

6.251 Accident risks could be minimized by temporarily rerouting roads during construction, and adding turn lanes, deceleration lanes, and acceleration lanes for heavy trucks when ROW is readily available. Flagmen, signage, cones, barricades, and detours would be used where required to facilitate movement of construction equipment, construction materials, and local traffic on affected road segments. If during construction it is determined that staging areas and access or haul roads would be situated outside the areas of analysis then a supplemental environmental document would be necessary.

HTRW

6.252 USACE construction contractors would plan to avoid areas with HTRW; however, if construction should reveal the existence of previously unknown HTRW, then work on that section would stop until the risk from HTRW can be evaluated and an appropriate response determined. USACE construction contractors would be required to provide and implement SWPPP and SPCCP plans for each particular reach of the NOV levee project to be constructed.

6.253 In addition, the USACE contractor would use BMPs as standard operating procedures during all construction activities. The contractor would be responsible for any hazardous waste generated during construction and would also be required to collect, characterize, label, store, transport, and dispose of as regulated by the USEPA, all non-recyclable hazardous and regulated wastes, to comply with RCRA and other applicable laws and regulations. Solid waste receptacles would be maintained at staging areas. Non-hazardous solid waste (trash and waste construction materials) would be collected and deposited in on-site receptacles. Solid waste would be collected and disposed of properly in accordance with the Solid Waste Disposal Act [P.L. 89-272, 79 Stat. 997, as amended by RCRA, P.L. 94-580, 90 Statute 2795 (1976)].

Noise

6.254 To minimize noise impacts, construction activities should be limited to daylight hours, to the extent practicable. Noise impacts should be less than significant near the residential neighborhoods of the project area.

Air Quality

6.255 During the construction of the proposed project, proper and routine maintenance of all vehicles and other construction equipment would be implemented to ensure that emissions are

within the design standards of all construction equipment. Dust suppression methods should be implemented to minimize fugitive dust. In particular, wetting solutions would be applied to the construction area to minimize the emissions of fugitive dust.

RECOMMENDED MITIGATION AND CONSERVATION MEASURES FROM U.S. FISH AND WILDLIFE SERVICE

6.256 This following contains a list of the major mitigation and conservation measures recommended by the USFWS in their Coordination Act Report, dated January 2011, and the USACE responses to those recommendations. These USFWS recommendations, as well as the entire Coordination Act Report, are contained in Appendix G.

6.257 Recommendation: To the greatest extent possible, design (*e.g.*, implementation of T-walls, sheet-pile, and/or cement floodwall in levee designs) and position flood protection features so that destruction of forested and emergent wetlands and non-wet bottomland hardwoods are avoided or minimized.

> Response: CEMVK will, to the greatest extent possible, design and position flood protection features so that destruction of forested and emergent wetlands and non-wet BLH are avoided or minimized. For any impacts on wetlands and non-wet BLH that are unavoidable, CEMVK is committed to providing mitigation.

6.258 Recommendation: Minimize enclosure of wetlands with new levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.

> Response: CEMVK is committed to minimizing the enclosure of wetlands with the new levee alignments.

6.259 Recommendation: The USACE shall fully compensate for any unavoidable losses to wet and non-wet bottomland hardwood habitat (-68.81 AAHUs), scrub-shrub habitat (-1.33 AAHUs), fresh marsh (-18.18 AAHUs), intermediate marsh (-37.37 AAHUs), brackish marsh (-20.67 AAHUs), and saline marsh (-76.21 AAHUs) caused by project features. Specific guidance and recommendations regarding details for mitigation planning, as well as potential locations of mitigation priority areas, are enclosed in Appendix A of the Fish and Wildlife Coordination Act Report (see Appendix G in this SEIS). All aspects of mitigation planning should be coordinated with USFWS, NMFS, USEPA, LDNR, and LDWF.

> Response: CEMVK is committed to mitigating for the project impacts on wetlands and non-wet BLH by compensating for the loss of these wetlands and BLH. CEMVK will coordinate with the USFWS, NMFS, USEPA, LDNR, and LDWF during mitigation planning.

6.260 Recommendation: Funds for full compensatory mitigation for the entire project should be set aside upfront to ensure that the Federal and local sponsors will have the capability of

offsetting unavoidable losses to the wetland habitats as listed in item #6.259 above, regardless of whether construction funding is procured by each levee reach.

Response: Mitigation would be completed concurrently with construction. It is possible that a large tract of land could be purchased up front that would be restored incrementally during construction.

6.261 Recommendation: Full compensation for marsh should be defined to be no less than 0.27 AAHUs per mitigation acre; however, that replacement rate may require redefining based on design of a specific proposed mitigation project to ensure full functional replacement.

Response: CEMVK will define the full compensation for marsh to be no less than 0.27 AAHUs per mitigation acre.

6.262 Recommendation: The USFWS recommends that mitigation alternatives include locating the mitigation within the basin where impacts occur.

Response: CEMVK commits to analyzing all reasonable mitigation sites. CEMVK will locate the mitigation within the basin where impacts occur, if practicable.

6.263 Recommendation: If a proposed project feature is changed significantly or is not implemented within one year of the September 10, 2009, Endangered Species Act consultation letter, the USFWS recommends that the USACE reinitiate coordination with the USFWS to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or designated critical habitat.

Response: The proposed project has not changed significantly since the September 2009 letter. However, CEMVK reinitiated coordination with USFWS on 28 January 2011. The USFWS responded on 11 February 2011 that the proposed project would have no effect on any Federally listed threatened or endangered species or their critical habitat.

6.264 Recommendation: Avoid adverse impacts on bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

Response: No bald eagle breeding or nesting areas are known to occur in the vicinity of the NOV levee project area. However, a qualified biologist will inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

6.265 Recommendation: To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period

(i.e., September 1 through February 15; exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

> Response: All construction activities would be restricted to the non-nesting period of wading birds if any rookeries are found within 1,000 feet of the activity. On-site contract personnel will be informed of the need to identify colonial nesting birds and their nests and avoid affecting them during the breeding season.

6.266 Recommendation: If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

> Response: CEMVK will perform an evaluation to determine whether the project is likely to disturb nesting bald eagles in the event a bald eagle nest is discovered within or adjacent to the proposed project area.

6.267 Recommendation: Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts on nesting migratory birds, when practicable.

> Response: Forest clearing associated with project features will be conducted during the fall or winter to minimize impacts on nesting migratory birds, when practicable. If clearing cannot occur in the fall or winter, preconstruction surveys will be conducted by a qualified biologist and active nests avoided until chicks have fledged.

6.268 Recommendation: Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the USACE should provide the necessary funding to ensure that mitigation obligations are met on behalf of the public interest. All costs (i.e., performance compliance and monitoring) until year five success criteria are attained shall be at the sole expense of the Federal sponsor.

> Response: In the event that the non-Federal sponsor is unable to fulfill the financial mitigation requirements, USACE would provide the necessary funding to ensure that mitigation obligations are met on behalf of the public interest. However, this does not relieve the non-Federal sponsor of its responsibilities or preclude USACE from pursuing recourse against the non-Federal sponsor.

6.269 Recommendation: Construction of or purchasing credit from an approved mitigation bank for all compensatory mitigation should be conducted concurrent with construction of the

NOV project (and concurrent with the Non Federal Levee project if mitigation is combined), to ensure that mitigation obligations are met on behalf of the public interest.

Response: CEMVK is committed to providing compensatory mitigation concurrent with construction of the NOV project, in order to ensure that mitigation obligations are met on behalf of the public interest.

6.270 Recommendation: If mitigation lands are purchased for inclusion within Federal- or state-managed lands, those lands must meet certain requirements; therefore, the land manager of that management area should be contacted early in the planning phase regarding such requirements.

Response: The land manager of Federal- or state-managed lands, will be contacted early in the planning phase regarding any requirements that need to be met, if such lands are used.

6.271 Recommendation: Further detailed planning of project features (*e.g.*, Design Documentation Report, Engineering Documentation Report, Plans and Specifications, or other similar documents) should be coordinated with the USFWS, NMFS, USEPA, LDNR, and LDWF, and the USACE shall provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

Response: CEMVK will coordinate with USFWS, NMFS, USEPA, LDNR, and LDWF, on any further detailed planning of the project will provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

6.272 Recommendation: If applicable, a General Plan should be developed by the USACE, the USFWS, and the managing natural resource agency in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.

Response: A General Plan will be developed by CEMVK, USFWS, and the managing natural resource agency in accordance with Section 3(b) of the Fish and Wildlife Coordination Act for mitigation lands.

6.273 Recommendation: A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the USACE, USFWS, NMFS, EPA, LDNR, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

Response: A report documenting the status of mitigation implementation and maintenance will be prepared provided to CEMVK, USFWS, NMFS, USEPA, LDNR, and LDWF.

6.274 Recommendation: The USFWS recommends that the mitigation plan be finalized prior to finalization of the Feasibility Study Report.

Response: The final report will be a combined Planning Implementation Report/Abbreviated Projected Information Report (PIR/APIR) and the mitigation plan is proposed to be finalized prior to the completion of the Final SEIS.

TOTAL MITIGATION REQUIREMENT

6.275 CEMVK will focus on priority areas that have been identified by USFWS, NOAA Fisheries, LDWF, and LDNR to implement restoration alternatives for impacts on habitats. If selected, these areas will fully mitigate the impacts related to the selected alternative. Mitigation sites have not been determined at this time, but, if practicable, the fresh/intermediate marsh and brackish marsh mitigation sites would occur on the east bank of the Mississippi River, and the saline marsh mitigation sites will be located on the west bank of the Mississippi River. BLH mitigation sites would likely occur within the same watershed as the impacted habitat, if practicable.

6.276 Table 6-18 displays the impacted habitats acres, resulting AAHU loss by alternative, and the required mitigation acres to compensate the losses.

Table 6-18. Mitigation for Impacts on the Natural Environment from the NOV Levee Alternatives and Borrow Areas

Habitats	Alternative 2 (TSP)			Alternative 3			Borrow Areas		
	Impacted Acres	AAHUs	Mitigation Acres	Impacted Acres	AAHUs	Mitigation Acres	Impacted Acres	AAHUs	Mitigation Acres
BLH - Wet	110.49	67.63	125.24	454.49	278.19	515.17	0.00	0.00	0.00
BLH - Dry	1.86	1.18	2.15	45.01	28.53	52.94	1658.9	608.8	1127.5
Scrub Shrub	2.96	1.33	3.48	57.65	25.93	48.02	0.00	0.00	0.00
Intermediate Marsh	75.26	37.37	138.41	128.62	40.86	151.33	0.00	0.00	0.00
Freshwater Marsh	82.96	18.95	70.19	315.15	78.98	292.52	0.00	0.00	0.00
Brackish Marsh	30.00	20.67	76.56	40.01	27.57	102.11	0.00	0.00	0.00
Saline Marsh	105.99	76.21	282.22	503.07	310.41	1149.67	0.00	0.00	0.00
Total All Habitats	**409.52**	**223.86**	**698.24**	**1,544.00**	**790.53**	**2,311.76**	**1,658.9**	**608.8**	**1,127.50**

6.277 CEMVK is responsible for implementation and construction of the wetland restoration project, as well as the maintenance and monitoring until specific performance criteria for success are met. CEMVK is also responsible for reporting activities. CEMVK will be the contracting entity, to provide contract oversight for implementation and monitoring. When all final success

criteria have been met or exceeded, all habitat restoration obligations will be considered complete. The full restoration and mitigation plan can be found in Appendix F.

SECTION 7.
LIST OF PREPARERS/CONTRIBUTORS

7. LIST OF PREPARERS/CONTRIBUTORS

7.1 The point of contact for this SEIS is Matt Mallard, USACE, Vicksburg District. Table 7-1 lists the preparers of relevant sections of this report. Mr. Mallard can be reached at the USACE, Vicksburg District, 4155 East Clay Street, Vicksburg, Mississippi 39183.

Table 7-1. Supplemental Environmental Impact Statement Preparation Team

EIS Section	Team Member
Project Manager, CEMVK	Paul Eagles, CEMVK
Environmental Manager, CEMVK	Matt Mallard, CEMVK
Environmental Supervisor, CEMVK	Christopher Koeppel, CEMVK
Project Manager, GSRC	Nicole Forsyth, GSRC
Geology and Soils, HTRW	Steve Oivanki, GSRC
Air Quality, Noise, Water Quality, Aquatic Resources, and EFH	Steve Kolian, GSRC
Aquatic Resources and EFH	Tami Wells, Ph.D., GSRC
Terrestrial Resources, T & E Species, and Wildlife	Carey Perry, GSRC
Floodplain Management	Curt Schaeffer, GSRC
Socioeconomics,	Shanna McCarty, GSRC
Wetland Value Assessment, Recreational Resources, and Aesthetic Values	Annie Howard, GSRC
Wetland Resources	Josh McEnany, GSRC
Cultural Resources	Bretton Somers, Ph.D., GSRC
GIS	Sharon Newman, GSRC
Technical Review	Chris Ingram, GSRC
Technical Review	Eric Webb, Ph.D., GSRC
Technical Review	Dennis Peters, GSRC

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SECTION 8.
PUBLIC INVOLVEMENT

8. PUBLIC INVOLVEMENT

8.1 This chapter describes the public involvement program to date and discusses how public views guided and were incorporated into the study process. It also describes future public involvement and includes the list of agencies, groups, and individuals to whom the Main Report/SEIS will be sent.

Public Involvement Program

8.2 Construction of the TSP will not commence until the TSP achieves environmental compliance with all applicable laws and regulations, as described below. Environmental compliance for the TSP would be achieved upon coordination of this SEIS with appropriate agencies, organizations, and individuals for their review and comments:

- USFWS and NOAA Fisheries confirmation that the TSP would not be likely to adversely affect any T&E species or completion of ESA Section 7 consultation (USFWS concurrence received 11 February 2011; see Appendix C);

- LDNR concurrence with the determination that the TSP is consistent, to the maximum extent practicable, with the Louisiana Coastal Resources Program;

- LDEQ issuance of a Section 401 Water Quality Certificate;

- Public review of the Section 404(b)(1) Public Notice and signature of the Section 404(b)(1) Evaluation;

- Coordination with the Louisiana SHPO, Indian Tribes, and other interested parties;

- Receipt and acceptance or resolution of all USFWS Fish and Wildlife Coordination Act recommendations;

- Receipt and acceptance or resolution of all LDEQ comments on the air quality impact analysis documented in the SEIS;

- Receipt and acceptance or resolution of all NOAA Fisheries EFH recommendations.

8.3 Correspondence generated during the preparation of this SEIS will be included in Appendix B. Table 5-1 provides a list of the relevant laws and regulations that guided the preparation of the SEIS.

8.4 Extensive public involvement has been sought in preparation of this SEIS. The project analyzed in this SEIS was publicly disclosed and described in the NOI to prepare an EIS, which was published in the *Federal Register* on 11 August 2009 and on the website www.nolaenvironmental.gov. Scoping for this project was initiated in September 2009 through placement of advertisements/public notices in the *New Orleans Times-Picayune*. Scoping

meetings were held on 12 September, 03 November, and 08 December 2009. Any comments received in a timely manner during development of the SEIS were considered in preparation of the document. The public was able to provide verbal comments during meetings and written comments after each meeting. Meetings were advertised in the *New Orleans Times-Picayune* one week prior to each meeting. Scoping meeting notices were also mailed out to those who had indicated a desire to be contacted regarding the meetings.

8.5 The scoping process enables USACE to gather information concerning sensitive resources from regulatory and responsible regulatory agencies and determine the public's major concerns. This information is considered both in the CEMVN study process and in preparation of this draft SEIS. Each scoping comment was reviewed for content and categorized by SEIS subject matter heading. A total of 18 general categories of comments were recorded from scoping meeting participants (Table 8-1).

Table 8-1. Scoping Meeting Comments

#	Comments	Number of Comments
1	Delay in NOV project schedule due to environmental impacts	10
2	Environmental or wetland impacts	3
3	Non-Federal levee system	1
4	Coastal Restoration	1
5	Length of public review period	1
6	Levee authorization	2
7	Time and dates of scoping meetings	2
8	Level of hurricane protection in Plaquemines Parish	7
9	Acquisition of land to build levees	1
10	Expand on protected side vs. flood side of levees	3
11	Mitigation and mitigation costs	6
12	Impact of NOV project on hydrology and flooding	3
13	Location and method of extracting borrow material	4
14	Project funding (NFL vs. NOV)	2
15	Louisiana Coastal Protection and Restoration (LACPR) buy-outs	1
16	Responsibility of road damage as result of the NOV project	1
17	Type of equipment used to build levees	1
18	Local people getting jobs with levee contractors	1

8.6 Public views and responses have been described in detail in the Scoping Report located in Appendix I. The draft SEIS will be circulated for a 45-day public review and comment period. A public hearing to describe the proposed project and solicit input will be held. All public correspondence generated during the preparation of this SEIS will be included in Appendix I.

Coordination

8.7 The SEIS will be provided to the following agencies, groups, and individuals for their review and comment.

8.8 Federal Agencies

U.S. Advisory Council on Historic Preservation
U.S. Environmental Protection Agency, Region VI
U.S. Department of Energy, Office of Environmental Compliance
U.S. Department of the Interior, Office of Environmental Policy and Compliance
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of the Interior, National Park Service
U.S. Department of the Interior, Minerals Management Service
U.S. Department of Commerce, National Marine Fisheries Service
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Department of Agriculture, Forest Service
U.S. Department of Transportation, Federal Aviation Administration
U.S. Coast Guard, 8th District
U.S. Department of Homeland Security, Federal Emergency Management Agency
Gulf of Mexico Program
Barataria-Terrebonne National Estuary Program

8.9 State

Governor's Executive Assistant for Coastal Activities
Governor's Office of Indian Affairs
Louisiana Department of Culture, Recreation & Tourism
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
Louisiana Department of Transportation and Development
State Library of Louisiana
Louisiana Division of Administration
Louisiana State Attorney General's Office
LA State Board of Commerce & Industry Research Division
Louisiana Department of Agriculture & Forestry
Louisiana Department of Public Works
Louisiana Office of Coastal Protection and Restoration

8.10 Louisiana Parishes

Plaquemines Parish

8.11 Tribes and Nations

Chitimacha Tribe of Louisiana
Alabama-Coushatta Tribe of Texas
Coushatta Tribe of Louisiana
Mississippi Band of Choctaw Indians
Tunica-Biloxi Indians of Louisiana
United Houma Nation
Inter-Tribal Council of Louisiana, Inc
Caddo Nation of Oklahoma
Chickasaw Nation
Choctaw Nation of Oklahoma
Jena Band of Choctaw Indians
Quapaw Tribe of Oklahoma
Seminole Nation of Oklahoma
Seminole Tribe of Florida

8.12 Others

Lake Pontchartrain Basin Foundation
Coalition to Restore Coastal Louisiana
Sierra Club, Delta Chapter
National Audubon Society, Baton Rouge Chapter

SECTION 9.
LITERATURE CITED

9. LITERATURE CITED

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SECTION 11.
ACRONYMS AND ABBREVIATIONS

11. ACRONYMS AND ABBREVIATIONS

AAHU	Average Annual Habitat Units
AADT	average annual daily traffic
ac	acre
ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
Ave	Avenue
BLH	Bottomland Hardwood
BMP	Best Management Practices
B.P.	before present
BTNEP	Barataria-Terrebonne National Estuary Program
CAA	Clean Air Act
CEMVK	USACE, Vicksburg District
CEMVN	USACE, New Orleans District
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CF	Contractor-Furnished
CFC	chlorofluorocarbon
CFDC	Caernarvon Freshwater Diversion Canal
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_{2e}	carbon dioxide equivalent
CWA	Clean Water Act
CWPPRA	Coastal Wetlands Planning, Protection, and Restoration Act
cy	cubic yard
dB	decibel
dBA	A-weighted decibel
DFIRM	Digital Flood Insurance Rate Map
DO	dissolved oxygen
Dr	Drive
EFH	essential fish habitat
EIS	Environmental Impact Statement
EO	Executive Order
ER	Engineering Regulation
ESA	Endangered Species Act or Environmental Site Assessment
ESRI	Environmental Systems Research Institute
F	Fahrenheit
FC	full compliance
ft	foot or feet
FEMA	Federal Emergency Management Agency

FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act
FWOP	Future Without Project
FWP	Future With Project
GAP	Gap Analysis Program
GDM	General Design Memorandum
GF	Government-Furnished
GHG	Greenhouse House Gases
GIS	Geographic Information System
GMFMC	Gulf of Mexico Fisheries Management Council
HFC	hydrofluorocarbon
HSI	Habitat Suitability Index
HTRW	Hazardous, Toxic, and Radioactive Waste
HU	Habitat Unit
HUD	U.S. Department of Housing and Urban Development
Hwy	Parish Highway
IER	Individual Environmental Report
IHNC	Inner Harbor Navigational Canal
IO	isolated occurrences
LA	Louisiana Highway
LACPR	Louisiana Coastal Protection and Restoration
LADOTD	Louisiana Department of Transportation and Development
LaMP	Louisiana Mapping Project
LDEQ	Louisiana Department of Environmental Quality
LDA	Louisiana Division of Archaeology
LDNR	Louisiana Department of Natural Resources
LDWF	Louisiana Department of Wildlife and Fisheries
LERRD	lands, easements, rights-of-way, relocations, and disposal areas
Ln.	Lane
LNHP	Louisiana Natural Heritage Program
LOS	level of service
m^3	cubic meter
MDP	Mississippi Deltaic Plain
mg	milligram
mi	mile
MOBILE	Mobile Source Emission Factor
MR&T	Mississippi River and Tributaries
MRL	Mississippi River Levee
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NFL	Non-Federal Levees
NHPA	National Historic Preservation Act

NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOV	New Orleans to Venice
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
N_2O	nitrous dioxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
O_3	ozone
Pb	Lead
PC	partial compliance
P.L.	Public Law
PM-2.5	particulate matter less than 2.5 microns
PM-10	particulate matter less than 10 microns
ppb	parts per billion
PPG	Plaquemines Parish Government
ppm	parts per million
ppt	parts per thousand
PVC	Polyvinyl Chloride
QRI	Quaternary Resource Investigations, LLC
RCRA	Resource Conservation and Recovery Act
Rd.	Road
REC	Recognized Environmental Condition
RECAP	Risk Evaluation/Corrective Action Program
RM	River Mile
ROW	right-of-way
SAV	submerged aquatic vegetation
SBA	Small Business Administration
SEIS	Supplemental Environmental Impact Statement
SHPO	State Historic Preservation Officer
SI	Suitability Index
SIP	State Implementation Plan
SO_2	sulfur dioxide
SPCCP	Spill Prevention, Control, and Countermeasures Plan
St	Saint or Street
SWPPP	Stormwater Pollution Prevention Plan
T&E	Threatened and Endangered
TDS	Total Dissolved Solids
TSP	Tentatively Selected Plan
TY	Target Year
U.S.	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VOC	volatile organic compounds
WMA	Wildlife Management Area
WRDA	Water Resources Development Act
WUS	Waters of the U.S.
WVA	Wetland Value Assessment
µg	microgram
µS	microSiemens