FINAL
ENVIRONMENTAL IMPACT STATEMENT
NEW ORLEANS TO VENICE, LOUISIANA, HURRICANE RISK REDUCTION PROJECT: INCORPORATION OF NON-FEDERAL LEVEES FROM OAKVILLE TO ST. JUDE, PLAQUEMINES PARISH, LOUISIANA

U.S. Army Corps of Engineers
Mississippi Valley Division
Regional Planning and Environmental Division South

ENVIRONMENTAL IMPACT STATEMENT
New Orleans to Venice (NOV), Louisiana, Hurricane Risk Reduction Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana

The responsible lead agency is the U.S. Army Corps of Engineers, New Orleans and Vicksburg Districts. The responsible cooperating agencies are the U.S. Fish and Wildlife Service, Louisiana Department of Environmental Quality, Environmental Protection Agency, Natural Resources Conservation Service, National Marine Fisheries Service, Louisiana Department of Wildlife and Fisheries, and Louisiana Department of Natural Resources.

ABSTRACT:

In August 2005, Hurricane Katrina caused major damage to Federal and non-Federal flood control projects in southeast Louisiana. In September 2005, Hurricane Rita caused further damage to this flood protection system. The non-Federal levees that are proposed to be incorporated into the New Orleans to Venice (NOV) hurricane protection project are located on the west bank of the Mississippi River in Plaquemines Parish, Louisiana. The project area lies in the delta of the Mississippi River commencing approximately 15 miles south of downtown New Orleans at the Oakville community and terminating at the St. Jude community. The average grade elevation of the existing non-Federal levee varies from approximately 8 feet on the northern end to approximately 3 feet in some reaches on the southern end. Because the grade elevation varies and differs by as much as 5 feet and recent hurricanes have degraded certain reaches, the current level of protection is of low reliability. The goal of this project is to provide enhanced storm surge protection and protect evacuation routes. The proposed project would maximize system reliability and minimize impacts to the human population and highly valued environmental resources. A full range of alternatives, including structural and nonstructural, were developed and evaluated for improving the flood risk management capability of the non-Federal levee system. A no-action alternative was also considered. Alternatives were evaluated against criteria such as engineering effectiveness, economic efficiency, and environmental and social acceptability. The proposed action, which represents the least environmentally damaging alternative to accomplish the needed risk reduction system improvements, would replace or modify 32 miles of existing non-Federal back levees on the west bank of the Mississippi River in Plaquemines Parish for incorporation into the NOV Federal levee system and construct from ground level 2 miles of earthen back levees. The levees would be raised to an authorized 2 percent design elevation, or approximately a 50-year level of risk reduction using the current design criteria. The estimated fully funded cost of the proposed action, including mitigation, is $456,000,000.

The closing date for receipt of comments is July 11, 2011.

If you would like further information on the supplement, please contact:

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1. SUMMARY

INTRODUCTION

1.1 Plaquemines Parish has long, narrow strips of protected land on both sides of the Mississippi River between New Orleans and the Gulf of Mexico. This protection is the result of incremental structural replacements or modifications over time. Hurricane and flood protection is currently provided by a system of Federal levees along the Mississippi River and Federal and non-Federal back levees. River levees protect from overbank flooding and typically lie along the river's bank. Back levees border the Gulf of Mexico's coastal wetlands and protect the land between the gulf and river from tropical storm surges. The distance between the gulf-side back levees and the river varies, but is usually less than 1 mile.

MAJOR CONCLUSIONS AND FINDINGS

1.2 The U.S. Army Corps of Engineers (USACE), Mississippi River Valley Regional Planning and Environment Division South (RPEDS), Vicksburg District (CEMVK), has prepared this Environmental Impact Statement (EIS) to evaluate the potential impacts associated with the replacement or modification of the non-Federal levee system (NFL) for incorporation into the New Orleans to Venice (NOV) Federal project in Plaquemines Parish, Louisiana. This EIS has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's (CEQ) regulations (40 CFR §1500-1508), and the USACE Engineer Regulation (ER) 200-2-2, Environmental Quality, Procedures for Implementing the NEPA. Further, this EIS evaluated plans in accordance with the requirements of Corps ER 1105-2-100, "Planning Guidance Notebook." Planning objectives developed to ensure compliance with the requirements of this regulation include (a) reduce risk to public safety from catastrophic storm inundation, (b) reduce damages from catastrophic storm inundation, (c) avoid and minimize impacts to existing residential or commercial structures, (d) minimize impacts to existing stormwater drainage canals, and (e) conserve accessibility to existing flood-side residential areas or commercial facilities.

1.3 In response to state and local interests concerns, the USACE is engaged in two separate projects on a complementary timeline that will reduce risk to people and property in Plaquemines Parish below Oakville where the Federally authorized Hurricane and Storm Damage Risk Reduction System (HSDRRS) ends. The NFL project includes replacement or modification of 32 miles of the current Plaquemines Parish NFLs between Oakville and St. Jude, Louisiana, on the west bank of the Mississippi River into the Federal NOV levee system and constructing 2 miles of earthen levees from ground level. The NOV will restore existing Federal levees on the east bank from Phoenix to Bohemia and on the west bank from St. Jude to Venice. The NOV project will be covered under a separate EIS.

1.4 Prior to May 2009, the Hurricane Protection Office (HPO), housed in the USACE New Orleans District (CEMVN), was responsible for the emergency repair and upgrade of the NOV and NFL following Hurricane Katrina. In an effort to maximize resources and take a regional approach, CEMVK assumed the responsibility for interagency coordination and the development of all NEPA documents associated with the NFL/NOV projects.

1.5 Plaquemines Parish Government (PPG) currently maintains the NFL system that was constructed on the west bank of the Mississippi River between River Miles (RM) 47.0 and 70.5. The non-Federal sponsors (NFS), the Louisiana Office of Coastal Protection and Restoration (OCPR) and PPG, seek to modify the levees that protect portions of Plaquemines Parish. Recent congressional legislation calls for the USACE to replace or modify approximately 32 miles of the NFL system, including the construction of 2 miles of earthen levee from ground level, and incorporate them into the Federal levee system.

RATIONALE FOR DESIGNATION OF SELECTED ALTERNATIVE

1.6 The selection of the proposed action was the result of a collaborative planning effort with Federal, state, local agencies, and members of the public. In Plaquemines Parish, the Federal hurricane storm damage and risk reduction system is authorized to protect against the Standard Project Hurricane (SPH) level event. The SPH level of protection therefore becomes the design criteria for replacing or modifying and incorporating the NFL into the Federal levee system. The goal of any structural alternative was to provide a closed levee system at the authorized upgraded NFL system which varies from 7.5 feet, National Geodetic Vertical Datum (NGVD), at the upper end to 13.0 feet, NGVD, at the lower end.

1.7 The Corps conducted and issued two public scoping meetings in March 2007 at Woodland Plantation, Port Sulphur, Louisiana, and Belle Chase Middle School Gymnasium, Belle Chase, Louisiana, respectively. Also, a public workshop was conducted in September 2009 at Belle Chase Middle School Gymnasium in Belle Chase. The overwhelming majority of the comments received from residents and local interests indicated that levee alignment, wetland and habitat, and project cost and duration were the three most important categories of issues to be included in this investigation. In addition, six interagency meetings were held between May and December 2008 to receive suggestions and ensure that all identified levee alignments were adequately defined and described and determined the criteria that would be used to evaluate and rank alignments for the replacement or modification of the NFL system.

1.8 A full range of alternatives was established, and a preliminary screening was conducted to identify alternatives which would proceed through further analysis. Alternatives were evaluated against criteria such as engineering effectiveness, economic efficiency, and environmental and social acceptability before determining the most feasible (per engineering), least environmentally damaging alternative to accomplish the risk reduction system modifications. The main objective was to maximize system reliability and minimize impacts to the human population and highly valued environmental resources such as various wetlands and dry bottom-land forest, while also keeping in mind schedule and cost.

SELECTED ALTERNATIVE

1.9 Alternative B, the proposed action alternative for the NFL, consists of recommended levee alignments to increase levee heights in order to reduce the risk associated with the 2 percent or 50-year level storm surge event. The 2 percent level of risk reduction (LORR) therefore becomes the design criteria for modifying and incorporating the NFL into the Federal levee system (including portions of the Mississippi River Levee (MRL)). The existing levee elevation would increase by approximately 3 to 4 feet, NGVD, in the northern portion of the project area and by 8 feet, NGVD, in the southern portion. Implementation of the recommended levee alignments would result in direct, long-term adverse impacts to 10.4 acres of fresh marsh, 16.1 acres of brackish marsh, 1.4 acres of scrub shrub, 24.9 acres of swamp, and 124.6 acres of bottom-land hardwood forests. Additionally, economic and biological resources adjacent to the proposed levee alignments may temporarily encounter some disruption or inconvenience during project construction as the levee is enlarged.

LOCALLY PREFERRED PLAN (LPP)

1.10 The LPP refers to designing specific levee sections at a higher grade than the Corps authorized levee grade with full financial burden being the responsibility of the NFS. The LPP is discussed in this document as alignment option B2 for analysis purposes. The PPG, with support from the Coastal Protection and Restoration Authority (CPRA) (the NFS), requested the Corps consider an LPP to raise the levees to the 1 percent LORR in the Oakville to La Reussite reach of the NFL. A design agreement was executed with the sponsors to enable funding of the LPP portion of preliminary design in this reach. The LPP only affects Section 1 of the NFL. The authorized levee height for the Section 1 upper 2.5 miles is 7.5 feet, NGVD, and the remaining portion is 9.0 feet, NGVD. The total area of impact for the authorized levee height, including the levee footprint, will be 133 acres. The LPP design would raise the authorized grade to 10.5 feet, NGVD, at the upper end and 12.5 feet, NGVD, at the lower end. The total impacted area of the LPP, including the levee footprint, would be 231 acres. The NFS would pay 100 percent of the increased cost for the additional work needed to raise the NFL to the 1 percent LORR to Section 1 beyond the cost required for the NOV authorized LORR (to include preaward activities/field investigations, construction, real estate, and environmental mitigation). The LPP only refers to the NFLs in this reach and not the MRL on the west bank of the Mississippi River; therefore, it does not in itself provide 1 percent LORR to the area encompassed by these levees.

CONSTRUCTION

1.11 In some cases where settlement is a significant issue, phased construction will be considered in order to reduce the footprint of the impacted zone and reduce the quantity of material required for construction. Temporary easements will be utilized for access and staging areas; however, acquisition will be perpetual levee easement/servitude for the levees and associated structures that are under construction. Construction of the proposed levee replacement or modification is planned to be conducted over a 3- to 5-year period, as weather and funding permit. A phased construction (over the same construction contract) of the levee

sections will allow the contractor to build each levee section to a determined height, then add additional material once the levee section has settled to a more consolidated state. This phased levee construction will recommence on the remaining levee sections to meet the authorized design heights. Phased levee construction will reduce the levee footprint width and result in reduced impacts. If settlement issues require footprints larger than reviewed in this document, additional impact analysis will be required under an EA or Supplemental EIS. Construction methods would be employed to avoid violating the Toxic Effluent Standards of Section 307 of the Clean Water Act. None of the proposed plans are expected to harm any threatened or endangered species or their critical habitat.

1.12 It is expected that the proposed material discharges would not cause or contribute to significant adverse effects on human health; the life stages of organisms within the aquatic ecosystem; or ecosystem diversity, productivity, and stability. Also, no significant impacts were identified on recreational, esthetic, or economic values. A detailed schedule is provided in the Project Management Plan.

1.13 Earthen levee construction requires a specific type of clay material which compacts well and prevents seepage. This material has specific requirements related to the amounts of sand, organic material, etc. Approximately 29,048,000 cubic yards of noncompacted clay would be required to modify or replace the entire NFL system to the 2 percent LORR. Borrow material is normally acquired 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 the Government for a specific contract, based on a borrow analysis. The following updated list of approved Government-furnished borrow areas will be considered: 1418/1420 Bayou Road; 1572 Bayou Road; 4001 Florissant; 910 Bayou Road; Belle Chasse NAS; Triumph East; Bonnet Carre South; Brad Buras; Cummings North; Dockville; West Bank I; West Bank F; Tabony; Bonnet Carre North - Phase 2; West Bank E - Phase 1; West Bank E - Phase 2; West Bank D; Tac Carrere, Stumpf - Phase 1; Stumpf - Phase 2; Johnson/Crovetto; and Bazile.

1.14 The NEPA coordination of the impacts for all potential borrow sources has been previously documented under several Individual Environmental Reports (IER), including IERs 18, 22, 25, and 28. Impacts associated with these IERs are compiled and summarized in Section 6. A transportation analysis of potential impacts due to hauling borrow to the construction sites is included in Section 6 of this document. All borrow IERs are posted on www.nolaenvironmental.gov. Prior to any borrow acquisition, the USACE will review the existing environmental documentation to ascertain if additional impact analyses or agency coordination will be necessary. If so, the USACE will produce an updated EA for that particular borrow area.

1.15 The project has been delayed due to issues related to design elevations and other factors; however, the schedule is set to begin construction in early 2012, assuming environmental clearance is obtained, along with execution of the Project Partnership Agreement and acquisition

of right-of-way. The project sponsors are preparing for construction and insist that further delays should not be tolerated. Any further delays will expose the project area to additional risk from hurricane surge without the benefit of the planned levee enlargements and is not acceptable.

REAL ESTATE ACQUISITION

1.16 The responsibility for providing privately owned lands, easements, rights-of-way, relocations, and disposal areas (LERRD) required for the project purposes as defined in the draft Project Partnership Agreement (PPA) is the responsibility of the Federal Government. The NFS has the responsibility to provide all LERRDs required for project purposes that are owned or claimed by non-Federal governmental entities.

SECTION 404 FINDINGS

1.17 As required by Section 404(b)(1) of the Clean Water Act (CWA), an evaluation to assess the short- and long-term impacts associated with the discharge of dredged and fill materials into waters of the United States resulting from this project has been completed (Appendix F). The proposed project features were designed to avoid to the extent practicable wetlands and waters of the United States. Unavoidable project-induced adverse impacts to wetlands will be fully compensated. No endangered species or their critical habitats are expected to be adversely impacted by the planned action. The requirement for the deposition of fill material during construction will add a relatively minimal amount of pollutants to the proposed project area's ecosystem. Pollutants would be primarily in the form of temporarily increased sediment loads that would result in minor increases in suspended solids and turbidity. The planned deposition of fill material is not expected to violate applicable state Water Quality Standards nor violate the Toxic Effluent Standards of Section 307 of the CWA.

COMPENSATORY MITIGATION

1.18 For both the NOV and NFL projects, unavoidable project-induced adverse impacts to wetlands will be fully compensated through the implementation or purchase of compensatory mitigation. Project-induced impacts have been calculated in consultation with the interagency Project Delivery Team (PDT), and a mitigation plan has been developed (Appendix J) that outlines selected mitigation strategies. Once potential mitigation sites have been identified, a site-specific mitigation work plan will be coordinated as a supplemental environmental document. Full compensatory mitigation for the selected alternative impacts and associated borrow will be conducted concurrently with project construction. Adequate funding for this effort has been budgeted.

FINDINGS ON EXECUTIVE ORDER 11988, "FLOODPLAIN MANAGEMENT"

1.19 Executive Order 11988 directs Federal agencies to reduce flood loss risk; minimize flood impacts on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by flood plains. Agencies must consider alternatives to avoid adverse and incompatible development in the flood plain. If the only practical alternative requires action in the flood plain, agencies must design or modify their action to minimize adverse impacts. The proposed action represents the least environmentally damaging alternative to accomplish the needed risk reduction system modifications.

FINDINGS ON EXECUTIVE ORDER 11990, "PROTECTION OF WETLANDS"

1.20 Executive Order 11990 directs Federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands if a practical alternative exists. Furthermore, agencies shall consider the action's effect on (a) public health, safety, and welfare, (b) maintenance of natural systems, including conservation and long-term productivity of existing flora and fauna, species and habitat diversity and stability, hydrologic utility, fish, wildlife, timber, and food and fiber resources, and (c) other wetland uses. The proposed action represents the least environmentally damaging alternative to accomplish the needed risk reduction system modifications. Where unavoidable wetland impacts are predicted, the proposed action includes compensation measures that will be implemented concurrently with project construction.

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

1.21 This Executive Order directs all Federal agencies to take the appropriate steps to identify and address any "disproportionately high and adverse" human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations. Implementation of the proposed action in the project area would enhance Federal hurricane protection in an area with existing lower level protection. Thus, implementation will benefit all residents of these areas alike. Direct adverse impacts from construction activities such as air quality, noise, traffic, etc., would also be exerted equally on minority and low income populations as well as nonminority and nonlow income populations of the Oakville through St. Jude areas. Indirect impacts from this action may include residential and commercial growth within the protected area. This indirect impact is not anticipated to exert disproportionately high indirect, adverse human health, and environmental impacts on minority and/or low-income communities.

FINDINGS ON EXECUTIVE ORDER 13045, "PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS"

1.22 Studies have concluded " . . . that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's neurological, immunological, digestive, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's size and weight may diminish their protection from standard safety features; and children's behavior patterns may make them more susceptible to accidents because they are less able to protect themselves. Therefore, to the extent permitted by law and appropriate, and consistent with the agency's mission," by Executive Order 13045, "each Federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." It has been determined that implementation of the proposed action would provide a higher level of protection than currently exists in the project area, thus providing a higher level of protection for all residents alike, including children, in association with any potential safety and health risks encountered during high velocity storm and floodwater events.

FINDINGS ON EXECUTIVE ORDER 13112, "INVASIVE SPECIES"

1.23 The proposed project is not expected to lead to the introduction of any new nonnative invasive species. Clean, earthen borrow material (i.e., material free from masses of organic matter, sticks, branches, roots, and other debris, including hazardous and regulated wastes) would be excavated from cleared agricultural land on the protected side of the levee and used to raise the levee along the selected alignment to a recommended height.

FINDINGS ON ER 1165-2-132, "HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE (HTRW)"

1.24 An American Society for Testing and Materials (ASTM) Phase I Environmental Site Assessment (ESA) was completed for the project area in July 2009. The Phase I ESA documented the Recognized Environmental Conditions (REC) for the project area. The project would not result in any direct adverse effects associated with HTRW. There is low potential for HTRW on proposed project lands. The HTRW report is presented in Appendix I.

AREAS OF CONTROVERSY

1.25 As a result of the focus group and public scoping meetings, issues relevant to the EIS were verified and clearly defined. The overwhelming majority of the comments received indicated that level of risk reduction, levee alignment, project cost and duration, and impacts to wetlands are the most important stakeholder issues.

1.26 Specifically, many public comments were received from residents of the Myrtle Grove Marina subdivision regarding potential impacts to their homes that would be induced by the proposed improvements to the non-Federal levees in Section 3. The tentatively selected plan, as outlined in this document, proposes to enlarge the existing levee around the Myrtle Grove Marina, shifting to the protected side. Some Myrtle Grove residents are concerned this plan will expose homes and potential homesites on the unprotected side to higher flood levels than would be the case if the existing levee was not modified.

1.27 In response to these comments, USACE conducted preliminary modeling of this area to determine the nature of any changes in storm surge. Preliminary analyses indicate that increasing the elevation of the levee to the proposed design heights may increase the 1 percent annual chance-of-occurrence storm surge levels on the flood side of the levee by amounts up to 1.5 feet for the set of storms that was simulated. The magnitude is affected by the storm track, size, intensity, and the location along the levee. The difference in peak surge diminishes to 0 to 0.1 foot approximately 2 to 6 miles in distance from the proposed levee footprint. Results of an analysis of wave modeling with and without the proposed action in place indicate the change in wave heights could vary between 0 and 0.3 foot.

1.28 Residents requested a floodgate across Wilkinson Canal be considered as an alternative to the current tentatively selected plan. Preliminary analysis by USACE suggests that a floodgate across Wilkinson Canal could impact up to 20 acres (above the tentatively selected plan) of saline marsh. Cost estimates were developed based on a floodgate recently constructed as part of the HSDRRS. This estimate indicated that the cost of the floodgate is potentially more expensive than construction of the levee recommended as part of the tentatively selected plan. Substitution of the floodgate for the levee therefore did not appear justified from an engineering standpoint at the time of this analysis. Additional investigations will continue involving team members from various disciplines to determine whether the various factors involved in this situation favor consideration of the floodgate or other measures to counteract changes in surge as a result of project implementation. If, in the future, USACE decides a floodgate across Wilkinson Canal would be in the best interest of the Government, a supplemental Environmental Assessment (EA) will be conducted to determine the potential impact and appropriate additional environmental documentation that might be necessary.

UNRESOLVED ISSUES

1.29 Based on the availability of funds, the possibility exists that a portion of the levee may proceed through design stage only. In this event, a tie-in to the west bank of the mainline MRL would be necessary with the preliminary assumption that a ramp would be needed where the levee crosses Louisiana Highway 23 (LA-23) near RM 56.0. The possible tie-in is proposed to be located in the southern segment of Section 3 where the distance to the existing MRL is the least. The tie-in would follow an existing parish road that is currently used as a travel corridor between the NFL and MRL levees. The tie-in levee would be constructed in an area currently composed of two modern roads, a medium strip, and disturbed right-of-way. The likelihood of this area containing sensitive environmental issues or intact cultural resources is very low. In the event that implementing Alterative C is necessary, USACE will issue supplemental environmental documentation. The MRL/NFL tie-in is evaluated in this document as Alternative C. Impacts associated with project construction will be mitigated concurrently with construction activities. The project will be accomplished in segments with mitigation concurrent with each constructed segment. While the possibility exists that 100 percent of the project may not be constructed; whatever portion of the project that is constructed will be fully mitigated.

RELATIONSHIP OF PLANS TO ENVIRONMENTAL REQUIREMENTS

1.30 Coordination and evaluation of required compliance with specific Federal acts, Executive Orders, and other policies for the selected plan were achieved in part through the coordination of this document with appropriate agencies and the public. Table 1-1 summarizes the level of compliance with those statutes, orders, and policies.

TABLE 1-1
COMPLIANCE WITH ENVIRONMENTAL LAWS, REGULATIONS,
AND EXECUTIVE ORDERS

Law, Regulation, or Policy	Status	Comments	Full Compliance Expected
Clean Air Act	Partial compliance	**Section 309:** Draft SEIS is being coordinated with the public and agencies. The EPA will rate the document. **Section 176:** No permanent sources of air emissions are part of the recommended plan.	Full compliance after coordination and review of EIS by EPA.
Clean Water Act	Partial compliance due to plan development	Section 404(b)(1) Evaluation is located in Appendix J; WQC will be required.	Partial compliance
National Environmental Policy Act of 1969	Partial compliance due to plan development	Draft EIS is being coordinated with the public and agencies. The EPA will rate the document.	Full compliance upon coordination of the final SEIS, public outreach activities completed, and signing of the Record of Decision (ROD).
Fish and Wildlife Coordination Act of 1958	Complies fully	The FWS and DOI are active team participants and have provided information on fish and wildlife elements on project.	Full compliance. The FWCA Report is included as Appendix B. The Partnership Agreement Letter (PAL) in presented in Appendix A.
Endangered Species Act of 1973	Complies fully	The FWS determined no endangered, threatened, or candidate species are present in the project area.	Full compliance
Magnuson-Stevens Fishery Mgt Act	Complies fully	Preparation of draft EFH assessment was coordinated with NMFS	Full compliance
Fishery Conservation and Management Act	Complies fully	The project has been coordinated with NMFS	Full compliance

TABLE 1-1 (Cont)

Law, Regulation, or Policy	Status	Comments	Full Compliance Expected
Coastal Zone Management Act o f 1972	Complies fully	The project has been developed to be consistent with the Louisiana Coastal Zone Management Program.	Full compliance. The Coastal Zone Consistency letter is included in Appendix C.
Coastal Barrier Resources Act and Coastal Barrier Improvement Act	Not applicable	There are no designated coastal barrier resources in the project area that would be affected by this project. These Acts do not apply.	Not applicable
Marine Mammal Protection Act	Complies fully	No marine mammals likely to be adversely affected.	Full compliance. The NMFS has also concurred.
Marine Protection, Research and Sanctuaries Act	Not applicable	Disposal of dredged material must comply with the Act.	Not applicable
Estuary Protection Act of 1968	Complies fully	No estuaries would be impacted by this project.	Full compliance
Anadromous Fish Conservation Act	Partial compliance	Anadromous fish species would not be affected. The project has been coordinated with NMFS.	Full compliance after review of the final EIS by NMFS.
Migratory Bird Treaty Act and Migratory Bird Conservation Act	Complies fully	No migratory birds would be affected by project activities.	Full compliance. The FWCAR is in Appendix B.
Wild and Scenic River Act of 1968	Not applicable	No designated Wild and Scenic river reaches would be affected by project-related activities.	Not applicable
Federal Water Project Recreation Act	Complies fully	The principles of this Act (Public Law 89-72) have been fulfilled.	Full compliance
Submerged Lands Act of 1953	Complies fully	The proposed work would not affect any submerged lands.	Full compliance
Rivers and Harbors Act of 1899	Complies fully	The proposed work would not obstruct navigable waters of the United States.	Full compliance

TABLE 1-1 (Cont)

Law, Regulation, or Policy	Status	Comments	Full Compliance Expected
National Historic Preservation Act of 1966 and the Archeology and Historic Preservation Act	Complies fully for Alternatives A, B, and B2. Partial compliance on Alternative C.	State Historic Preservation Officer (SHPO) and tribal coordination was conducted and completed for Alternatives A, B, and B2. Consultation under Section 106 of the NHPA will continue for Alternative C if that plan moves forward.	Full compliance for Alternatives A, B, and B2. Partial compliance on Alternative C. The SHPO and tribal concurrence is in Appendix G
RCRA, CERCLA, Toxic Substances Control Act of 1976	Complies fully	An HTRW assessment has been performed to identify sites of concern in the project area and vicinity (Appendix I).	Full compliance
Farmland Protection Policy Act of 1981	Partial compliance	Prime and unique farmlands coordination ongoing with NRCS.	Partial compliance
Executive Order 11988, "Floodplain Management"	Complies fully	Design plans included avoidance, minimization, and mitigation measures.	Full compliance
Executive Order 11990, "Protection of Wetlands"	Complies fully	Design plans minimized the loss and/or degradation of wetlands.	Full compliance
Executive Order 12898, "Environmental Justice"	Complies fully	No minority or low-income communities would be adversely affected by the project.	Full compliance
Executive Order 13045, "Protection of Children from Environmental Health Risks and Safety Risks"	Complies fully	No minority or low-income communities would be adversely affected by the project.	Full compliance
Executive Order 13089, "Coral Reef Protection"	Not applicable	This project would not adversely impact coral reefs or coral reef resources.	Not applicable
Executive Order 13112, "Invasive Species"	Complies fully	Project is not expected to lead to propagation of any invasive species.	Full compliance

SOURCE: USACE

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3. NEED FOR AND OBJECTIVES OF ACTIONS

3.1 On 29 August 2005, Hurricane Katrina caused major damage to the Federal and non-Federal flood control projects in southeast Louisiana. Hurricane Rita followed this storm on 24 September 2005, made landfall on the Louisiana-Texas state border, and also caused damage to Federal and non-Federal flood control projects in southern Louisiana. Subsequent to the storms, the Corps, working with state and local officials, undertook emergency repairs to Federal and non-Federal flood control projects and related works in the affected area.

3.2 The existing back levee was constructed with non-Federal funds on the west side of the Mississippi River to provide hurricane flood protection from Oakville to St. Jude. The levee has settled and degraded to various degrees, with the northern portion in better condition and at higher elevations than the southern portion. The average grade elevation of the existing levee varies from approximately 8 feet on the northern end to approximately 3 feet in some reaches on the southern end. Because the grade elevation varies by as much as 5 feet and recent hurricanes have degraded certain reaches, the current level of protection is of low reliability.

3.3 The non-Federal levee, as previously noted, has received only emergency repairs from hurricane-related damages. This condition exposes residents and businesses in several west bank communities and the hurricane evacuation route (Louisiana Highway 23 (LA-23)), to a higher potential for flooding in the event of a storm or hurricane. The majority of the existing NFL is below the authorized 50-year level of protection. This deficiency results in a 64 percent chance of homes being inundated during a hurricane event that equals a 50-year flood level during the period of evaluation.

3.4 The purpose of this Environmental Impact Statement (EIS) is to document the potential impacts associated with various alternatives to upgrade and incorporate certain non-Federal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing Federal levee system. This report evaluates the potential impacts associated with the replacement or modification of the non-Federal levee system (NFL) in Plaquemines Parish. This document has been prepared in accordance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality regulations, as reflected in the USACE Engineer Regulation (ER) 200-2-2, “Procedures for Implementing NEPA.” It documents potential impacts associated with alternatives to upgrade the NFL, and it describes engineering, economic, and environmental analyses used by the USACE, Vicksburg District (CEMVK), in determination of the proposed action. Storm risk reduction alternatives have been identified, evaluated, and screened so that the proposed action would be conducted in a timely, environmentally sensitive, and cost-effective manner.

3.5 Given the requirements of USACE ER 1105-2-100, “Planning Guidance Notebook,” the goal of this project is to provide enhanced storm surge protection and protect evacuation routes.

3.6 Planning objectives were developed to ensure compliance with the requirements of this regulation. The objectives for this project are to:

1. **Reduce risk to public safety from catastrophic storm inundation**. The plan should ensure that LA 23, the main evacuation route on the west bank, is protected to the extent possible from Oakville to St. Jude.

2. **Reduce damages from catastrophic storm inundation**. Future economic damages to existing homes and businesses should be minimized through the implementation of nonstructural and/or structural measures.

3. **Avoid and minimize impacts to existing residential or commercial structures**. Any structural plan should avoid homes or businesses, or minimize such effects to the maximum extent practicable.

4. **Minimize impacts to existing stormwater drainage canals**. Any structural plan should maintain the existing stormwater drainage pattern, which is generally assumed to be westward from the Mississippi River toward the existing NFL system, and then north or south toward the closest existing pump station. If a proposed levee footprint were to cut across or cover an existing drainage canal, the plan should provide a new drainage canal or structure along the protected side of the new levee alignment that extends to the existing pump station or any relocated pump station.

5. **Conserve accessibility to existing flood-side residential areas or commercial facilities**. When space is available, any structural plan would consider providing public ramps going above and across the top of the modified levee to maintain existing vehicular access. When space is limited, the plan would consider providing a vehicular swing gate as part of a T-wall structure system.

STUDY LIMITATIONS

3.7 This EIS has been developed to document engineering, environmental, and economic evaluations of alternative levee alignments that were conducted to support determination of a proposed plan for incorporating existing non-Federal back levees from Oakville to St. Jude into the New Orleans to Venice (NOV), Louisiana, Hurricane Protection Project. Engineering components consisting of geotechnical, structural, hydraulic, levee design, and cost considerations were assessed for all alternative alignments. The descriptions of the alternatives include technical assumptions regarding the size, configuration, material requirements, volume requirements, and other parameters used to estimate quantities for cost estimating and site capacity determinations. Potential impacts of activities related to operation of the levee system have also been evaluated in this study.

3.8 More precise details will be determined in followup studies such as geotechnical and engineering analyses and current-day cost estimates when preparing engineering plans and specifications. Additional requirements under NEPA or other statutes and regulations may be required in the future, as well.

PROJECT AUTHORITY

3.9 Congress and the Administration granted a series of supplemental appropriations acts following Hurricanes Katrina and Rita to repair or improve Federal and non-Federal flood control projects and related works in the affected area. The New Orleans and Vicksburg Districts conducted the study described in this document under the authorities described below.

1. Under these authorities, a total of $671,000,000 is allocated for construction at full Federal expense to replace or modify the non-Federal levees on the west bank in Plaquemines Parish from Oakville to St. Jude and incorporate the levees into the Federal levee system for the purpose of providing enhanced storm surge protection and protection of the evacuation route.

2. The Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery of 2006 (4th Supplemental - Public Law 109-234, Title II, Chapter 3, Flood Control and Coastal Emergencies [120 STAT. 454-455]) provides: ''For an additional amount for 'Flood Control and Coastal Emergencies,' as authorized by section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricane Katrina and other hurricanes, $3,145,024,000, to remain available until expended: Provided, that the Secretary of the Army is directed to use the funds appropriated under this heading to modify, at full Federal expense, authorized projects in southeast Louisiana to provide hurricane and storm damage reduction and flood damage reduction in the greater New Orleans and surrounding areas; . . . *$215,000,000 shall be used to replace or modify certain non-Federal levees in Plaquemines Parish to incorporate the levees into the existing New Orleans to Venice hurricane protection project*; . . . .'' The Flood Control and Coastal Emergencies Section of Title II, Chapter 3, of the Joint Explanatory Statement of the Committee of Conference, page 115, states: ''Funds totaling $3,145,024,000 are recommended to continue repairs to flood and storm damage reduction projects . . . *These projects are to be funded at full Federal expense* . . . Additionally, the Conferees include: . . . *$215,000,000 for incorporation of non-Federal levees on the west bank of the Mississippi River in Plaquemines Parish in order to provide improved storm surge protection and to protect evacuations routes*; . . . .''

3. The U.S. Troop Readiness, Veterans' Care, Katrina Recovery, and Iraq Accountability Appropriations Act, 2007 (5th Supplemental - Public Law 110-28, Title IV, Chapter 3, Flood Control and Coastal Emergencies [121 STAT. 153-154]) provides: "For an additional amount for 'Flood Control and Coastal Emergencies,' as authorized by section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricanes

Katrina and Rita and for other purposes, $1,407,700,000, to remain available until expended: *Provided, . . . The Secretary of the Army is . . . to prosecute these projects in a manner which promotes the goal of continuing work at an optimal pace, while maximizing, to the greatest extent practicable, levels of protection to reduce the risk of storm damage to people and property . . . .*"

4. The Supplemental Appropriations Act, 2008 (6th Supplemental – Public Law 110-252, Title III, Chapter 3, Flood Control and Coastal Emergencies [122 STAT. 2349-2350]) provides: ''For an additional amount for 'Flood Control and Coastal Emergencies,' as authorized by section 5 of the Act of August 18, 1941 (33 U.S.C. 701n), for necessary expenses relating to the consequences of Hurricane Katrina and other hurricanes of the 2005 season, $2,926,000,000, to become available on October 1, 2008, and to remain available until expended: *Provided*, That funds provided herein shall be used to reduce the risk of hurricane and storm damages to the greater New Orleans metropolitan area, at full Federal expense, for the following: . . . *$456,000,000 shall be used to replace or modify certain non-Federal levees in Plaquemines Parish to incorporate the levees into the existing New Orleans to Venice hurricane protection project*; . . . ."

5. On 14 April 2010, CEMVN Commander provided Design Direction guidance to the PDT to continue design work on the existing levee alignment per Congressional preference except where a deviation is required for sound engineering reasons. The PDT proceeded to reconsider the recommended levee configurations based on the preferential existing NFL levee alignment. The reconsideration process culminated in a joint decision briefing on 6 July 2010 between the CEMVN Commander and the CEMVK Commander (represented by the CEMVK Deputy Commander) and the CEMVK and CEMVN staff, resulting in a Memorandum for Record (MFR) dated 14 July 2010. Based on current cost estimates, remaining funds may not be sufficient to complete the fully designed levee project. See Section 1.25 for more information.

LEVEL OF RISK REDUCTION

3.10 The 50-year level of protection actually means reducing risk from a storm surge that has a 2 percent chance of being equaled or exceeded in any given year. The 2 percent chance is based on the combined chances of a storm of a certain size and intensity (pressure) following a certain track that results in a 50-year surge event. The Vicksburg District generated models of numerous different hurricanes with a wide variety of paths, forward speeds, rainfall volumes, intensities, and physical size (radius). These data allowed the estimation of the amount of surge and waves that would be produced by various storms, which in turn was used as the basis for determining the structural specifications required to provide a 2 percent level of protection.

3.11 The elevation or height of the structures being designed and built considered a number of other factors besides the surge and wave levels. For example, expected sea level rise, settlement and subsidence of structures, and possible increases in storm severity or frequencies were all factored in to the final design of the structures.

3.12 A hydraulic technical analysis was performed using the original design hurricane specified in the General Design Memorandum (GDM). The original design hurricane was established by using a suite of hurricane events over a period of time in the project area and determining the average frequency of the events. The technical analysis yielded results that determined the design hurricane, when applied to the current Hurricane Storm Damage Risk Reduction System (HSDRRS) and LACPR technical framework, were inconsistent with the GDM elevations being used to design the NOV and NFL projects. Further analysis concluded that the original GDM elevations for the entire NOV system are less than elevations required to provide a 100-year level of risk reduction (LORR) based on the 2010 ADCIRC and STWAVE model. It was determined that 2 percent design elevations more closely reflect the original GDM elevations; therefore, implementing the original GDM elevations would provide approximately a 50-year LORR using the current design criteria. Based on these considerations and results, a 50-year base LORR was recommended for the NOV system. This LORR is in line with the original intent of the design of the Federal NOV system, and new levee grades were computed and used by the Project Delivery Team (PDT) for the levee alignment configurations under review. There would need to be an Act of Congress – authorization and funding, in other words, permission and funds - for the Corps to construct the PPNFL system and NOV systems to the same level of risk reduction being used on the HSDRRS.

COURSE OF ACTION (COA)

3.13 Earlier cost estimates for completing the work on the NFL were based on the assumption that existing design approaches at the time would be used for project implementation. Since that time, design criteria for HSDRRS have changed, as described above, making the earlier estimates somewhat obsolete. The PDT developed a rough order of magnitude (ROM) estimate to provide consistent 2 percent LORR for both the NOV and NFL reaches and determined that funding in-hand was not adequate to construct the 2 percent LORR. Consequently, the PDT formulated several possible COA to move forward. Three COAs were screened by the PDT and forwarded to the USACE, Mississippi Valley Division (CEMVD), executive office and the non-Federal project sponsors (Coastal Protection and Restoration Authority (CPRA) and Plaquemines Parish Government (PPG)). Those COAs are presented below:

1. COA 1 would use available project funds to build to a consistent levee height for the entire length of each project. It would be lower than the authorized LORR, but would be consistent.

2. COA 2 would provide for design of the entire system at the 2 percent LORR up to the level needed for reliable cost estimates and complete design and construction for priority reaches. It is possible that most of the entire NFL project can be implemented depending on a variety of factors as we move into construction. Much of the NOV project can be completed and, depending on “allocations,” additional work can be added if funding becomes available.

3. COA 3 is similar to COA 2 except that no preliminary design would be accomplished for items without priority for construction.

3.14 After review, CEMVD, PPG, and CPRA supported COA 2 to proceed with the project. The PPG and CPRA were consulted regarding construction priorities. At some point during the implementation of COA 2, project funds may be exhausted prior to completing the entire NFL reach. This event will require the existing NFL be tied to the Mississippi River levee (MRL) system by constructing a connecting levee, with consistent LORR, between the two systems. The PDT has determined the most likely geographic line on which this would occur, and this additional levee is referred to within this document as "Alternative C." Section 6 provides a detailed discussion of the environmental impacts associated with Alternative C. In the unlikely event that the tie-in between the NFL and MRL is constructed outside the project area analyzed for Alternative C in this document, then USACE will produce a separate supplemental environmental document and public/agency coordination for that action.

STUDY/PROJECT AREA

3.15 The project is located on the west bank of the Mississippi River in Plaquemines Parish between Oakville and St. Jude (Figure 3-1). This area lies in the delta of the Mississippi River approximately 15 miles south of downtown New Orleans. Barataria Bay, an estuary of the Gulf of Mexico, lies on the west side of the Mississippi River delta. The project area consists of a narrow strip of land enclosed by the NFL to the west and by the Federal Mississippi River levee to the east along the Mississippi River's west bank. The northern and southern bounds of the project area are the communities of Oakville and St. Jude, respectively. The project area extends on the flood-side of the NFL into the coastal marshes along the northeastern perimeter of Barataria Bay. It also extends east to include the Mississippi River. On the Mississippi River, the northern and southern project area limits correspond approximately to River Miles 70 and 46, respectively. LA-23 parallels the Mississippi River along the west bank and traverses the levee-protected area.

3.16 To effectively evaluate the project area, the west bank of the Mississippi River from Oakville to St. Jude was divided into five reaches or sections based on existing site-specific characteristics, problems, and opportunities (Figure 3-1). A brief description of each section as follows:

1. **Section 1 – Oakville to La Reussite**. This section starts at the beginning of the project limit in Oakville and extends south to La Reussite. The beginning point is south of the Hero Canal, in the vicinity of a Federal Emergency Management Agency (FEMA) temporary trailer site west of the Belle Chasse Highway (LA 23). The end point is near the outfall canal of the Mississippi siphon pipes at La Reussite. In this section, there are 8.0 miles of existing NFL.

2. **Section 2 – La Reussite to Myrtle Grove**. This section starts near the outfall canal of the Mississippi River siphon pipes at La Reussite and ends to the south near Marina Road at Myrtle Grove. In this section, there are 11.8 miles of existing NFL.

3. **Section 3 – Myrtle Grove to Citrus Lands**. This section begins near Marina Road in Myrtle Grove and ends to the south near Lake Hermitage Road at an area referred to as Citrus Lands. In this section, there are 3.1 miles of existing NFL.

Figure 3-1. NFL Sections, Oakville to St. Jude.

Section 4 – Citrus Lands to Pointe Celeste. This section begins near Lake Hermitage Road at Citrus Lands and ends south of Pointe Celeste approximately 1,500 feet north and west of the West Pointe a La Hache pump station and siphon. This endpoint is where the existing NFL approaches LA 23 from the south and makes a right turn to parallel the highway. In this section, there are 9.0 miles of existing NFL.

4. **Section 5 – Pointe Celeste to St. Jude**. The section begins approximately 1,500 feet north and west of the West Pointe a La Hache pump station and siphon and ends at the south project limit at St. Jude Road where the north end of the existing St. Jude to City Price Federal back levee begins. There are 1.1 miles of existing NFL in the upper or northern portion of this section. In the lower portion of Section 5, there is no existing non-Federal back levee along the gulf-side of LA 23 for a distance of about 2 miles.

HISTORY OF THE AREA

3.17 Plaquemines Parish has long, narrow strips of protected land on both sides of the Mississippi River between New Orleans and the Gulf of Mexico. This protection is the result of incremental structural enhancements over time. Hurricane and flood protection is currently provided by a system of Federal levees along the Mississippi River and Federal and non-Federal back levees. River levees protect from overbank flooding and typically lie along the river's bank. Back levees border the Gulf of Mexico's coastal wetlands and protect the land between the gulf and river from tropical storm surges. The distance between the gulf-side back levees and the river varies, but is usually less than 1 mile.

1. **Plaquemines Parish Federal hurricane and flood protection projects**. Three principle USACE-constructed hurricane protection and flood damage risk reduction projects are located in Plaquemines Parish. These projects, in order of implementation, are Mississippi River and Tributaries (MR&T), MRL; NOV Hurricane Protection; and West Bank and Vicinity Hurricane Protection.

2. **MR&T, MRL, Louisiana**. Authorized by the Flood Control Act of 1928 and subsequent amendments, the MRL protects the Parish from river flooding. The Plaquemines Parish East Bank MRL system extends from the Parish line at Braithwaite 35 miles downstream to Bohemia. The west bank Plaquemines MRL system extends from the parish line at Belle Chasse 70 miles downstream to Venice and lies east of the Oakville to St. Jude NFL.

3. **NOV hurricane protection**.

a. Authorized by the Flood Control Act of 1962 (Public Law 87-874), the NOV Louisiana, Hurricane Protection Project is a system of back levees and a river levee that protects the Parish from hurricane tidal overflow and river flooding.

b. Altogether, the Plaquemines Parish MRL and NOV systems include 162 miles of levee and 7 miles of floodwall. The levees are crossed by numerous oil pipelines. Below Port Sulphur (29 miles above Venice), the MRL design grade is lower than the NOV hurricane design grade so the NOV is constructed as berms or floodwalls on top of the MRL. There are 15 non-Federal pump stations in the Parish for interior drainage.

4. **West bank and vicinity hurricane protection (WBV)**.

a. Authorized by the Water Resources Development Acts (WRDA) of 1986 (Public Law 99-662), 1996 (Public Law 104-303), and 1999 (Public Law 106-53), the WBV is located on the west bank of the Mississippi River in the vicinity of New Orleans and in Jefferson, Orleans, and Plaquemines Parishes. It will reduce the risk of storm surges from Lake Cataouatche, Lake Salvador, and other waterways leading to the Gulf of Mexico through Barataria Bay. The south end of the WBV system includes a component at Oakville in the vicinity of Hero Canal (under study by CEMVN) which is also the north end of the project area addressed in this document. This component is an important part of the WBV system because it is a "tie-in" that connects the WBV to the MRL system, thereby closing the hurricane protection system on the west bank. A swing gate system was determined to be the best alternative for the Oakville eastern tie-in between the WBV and MRL systems.

b. The proposed action described in this document would tie the north end of the existing non-Federal levee at Oakville to the WBV levee system at Oakville and Hero Canal.

5. **Plaquemines Parish NFL**.

a. There are approximately 51 miles of non-Federal gulf-side or back levees in Plaquemines Parish along the banks of the Mississippi River. On the east bank, 18 miles of non-Federal back levees extend in the upper parish from Braithwaite to White's Ditch. The 32 miles of non-Federal back levees on the west bank that extend from Oakville to St. Jude are the focus of this report. The levees were constructed with non-Federal funds, both private and public, to provide hurricane flood protection. They have typically been constructed with material obtained immediately adjacent to the levee during drainage canal excavation. The NFL system also includes a number of pump stations on both sides of the river. These pump stations are estimated to provide pumping capacity for approximately a 2-year rainfall event and are intended to handle the accumulation of interior water. Four existing pump stations located on the west bank function as part of the Oakville-St. Jude NFL system (Ollie, Wilkinson, Point Celeste, and West Pointe a La Hache). The local government is responsible for operating and maintaining existing pump stations. The only improvements provided by the Corps will be fronting protection at each pump station. One exception will be the Wilkinson Canal Pump Station which will be replaced in-kind due to levee realignment. Although construction completion dates for some components of the NFL system are unknown, known completion dates range from the 1950s to the 1990s; the majority of known items were completed in the 1960s and 1970s (USACE 2008 [final EAR]).

b. The Plaquemines Parish NFLs were not built to Federal standards. On the west bank, the existing elevation of the Oakville-St. Jude levee varies by location. The levee has settled and been degraded to various degrees. In the northern area of the levee system, the existing levee elevation is generally 8 feet for approximately 8 miles. The remainder of the levee system to the south has an existing elevation of approximately 4 feet or less for approximately 24 miles.

6. **Hurricanes Katrina and Rita**.

a. The Hurricane Katrina storm surge in 2005 caused the overtopping of many of the Federal and non-Federal levees in Plaquemines Parish. In the southern area of the Parish, the stormwaters overtopped the eastern levee system, crossed over the Mississippi River, overtopped the west bank MRL, flooded the west bank area, and then overtopped the back levee system. Floodwaters became trapped between the MRL and the back levee and flooded approximately 38,000 acres of the Parish.

b. All of the levees, Federal and non-Federal, in Plaquemines Parish sustained damage from Hurricanes Katrina and Rita. There was considerable crown and slope scour along the total length. The MRL slope pavement sustained damage from the many ships and barges that crashed upon it. There were also several severe breaches, coinciding with pipeline crossings and with some floodwalls. Five of the 6 miles of NOV floodwall along the Mississippi River were damaged beyond repair. There were major breaches at sheet-pile wing walls at two pump stations in the back levee. A major breach occurred at the Shell pipeline crossing near Nairn. The West Pointe a la Hache pipeline crossing was severely damaged. Wind and water damage from Katrina and Rita severely impacted nearly every residential and commercial structure within the east bank area of protection and on the west bank below Myrtle Grove (50 miles above Venice).

c. In response to these natural disasters, USACE Task Force Guardian has divided the Plaquemines Parish flood protection recovery process into 22 projects. The Corps has undertaken repairs to damages to the Federal component of the parish's hurricane protection system. CEMVN has also performed repair work on the NFL in Plaquemines Parish, as well as the non-Federal pump stations.

PRIOR STUDIES AND RELATED REPORTS

3.18 This EIS builds upon the 1974 Final EIS (FEIS) and two later SEISs prepared by CEMVN for the NOV Hurricane Protection Project. These documents are described below and are incorporated into this document by reference.

1. **FEIS for New Orleans to Venice, Louisiana, Hurricane Protection Project (USACE, 1974).**

a. On 30 July 1962, the Chief of Engineers submitted a report that recommended improvements along the Mississippi River below New Orleans to prevent damages to the developed areas of St. Bernard and Plaquemines Parishes from hurricane tidal surges and overflow. The plan recommended increasing the heights of existing back levees and modifying existing drainage facilities at four primary river reaches: Reach A on the west bank between City Price and Empire (Tropical Bend); Reach B on the west bank between Empire (Tropical Bend) and Venice; Reach C on the east bank between Phoenix and Bohemia; and Reach D on the east bank for approximately 8 miles between Violet and Verret. The plan recommended in the report was authorized by the 1962 Flood Control Act (Public Law 87-874). Following authorization, the hurricane protection project was officially named the New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV). In 1964, Reach B was divided into two separate units: Reach B1, between Empire (Tropical Bend) and Fort Jackson; and Reach B2, between Fort Jackson and Venice. Construction of an interim levee in Reach C began in 1966. Meanwhile, major hurricanes that passed through the area (Betsy, 1965; Camille, 1969) produced massive overtopping of the main river levees of the MR&T project by surges driving from Breton Sound to the east.

b. As a result, in 1969, CEMVN initiated a review of the project to study the possible necessity to modify the MRL to accomplish the level of hurricane protection envisioned by NOV. As part of this review, two alternate plans were developed for protecting the west bank project areas from 100-year hurricane tidal surges from Breton Sound. The first option consisted of raising the west bank MRL to a grade sufficient enough to prevent overtopping by tidal surges from the east. The second option consisted of a barrier levee on the east bank from Bohemia to a point 10 river miles above the Head of Passes, coupled with minor enlargement of the west bank MRL from Fort Jackson to Venice. Completed in 1970, the review determined that the barrier levee on the east bank was both more feasible and economical at that time.

c. The FEIS was prepared by CEMVN to document the potential impacts associated with alternatives to implement the complete NOV project. Major features of the proposed action were raising the existing back levees in Reaches A and B on the west bank from City Price to Venice and installing a new floodgate at Empire; raising the existing back levees in Reach C on the east bank from Phoenix to Bohemia; and constructing a new barrier levee (considered an extension of the MRL) on the east bank from Bohemia to 10 miles above the Head of Passes, along with a minor enlargement of the existing MRL on the west bank from Fort Jackson to Venice (this last feature would later be referred to as the barrier plan).

d. Alternatives that were considered included no action, nonstructural measures consisting of flood proofing of buildings, and the option of raising the west bank MRL. The no-action alternative was dismissed because it would not prevent future storm damages. Nonstructural measures were not preferred because significant economic damages would still

occur to existing infrastructure such as bridges and transformer stations. The alternative of raising the west bank MRL to a grade sufficient enough to prevent overtopping by tidal surges from the east was not preferred because the required setback would adversely affect a densely developed area. Unavoidable impacts associated with the proposed plan included the destruction of approximately 1,000 acres of coastal marsh for borrow purposes and adverse effects on another 8,500 acres of coastal marsh to be used as temporary detention areas. The FEIS was filed with the Council on Environmental Quality on 16 January 1975.

2. **Supplement I, FEIS for New Orleans to Venice, Louisiana, Hurricane Protection Project (USACE, 1985)**. At some point after its filing, the FEIS was determined not to be adequate by environmental standards at that time, and a revised document was prepared. The supplement to the FEIS evaluated potential impacts associated with construction alternatives to modifying existing back levees in Reach A (west bank between City Price and Tropical Bend). Three plans, a sand core hydraulic clay covered levee, an I-wall within the existing back levee interspersed with earthen levee plugs for cross-over vehicle access, and no-action were retained for evaluation. Two alternatives for mitigation of construction-related marsh losses were also evaluated, including the placement of dredged material and creation of natural delta-splays. The sand core hydraulic clay covered levee would involve the hydraulic pumping of sand from the Mississippi River and clay from selected borrow areas in adjacent marshes. The I-wall option did not involve sand, but did require clay from borrow areas in marshes. The no-action plan would be equivalent to the future conditions without the project. The sand core hydraulic clay covered levee with delta-splay marsh mitigation was recommended because it addressed the identified public concerns and made a better net positive contribution to the goal of National Economic Development (NED). The final of this first supplemental was filed with the Environmental Protection Agency (EPA) on 12 April 1985.

3. **Supplement II, FEIS for New Orleans to Venice, Louisiana, Hurricane Protection Project (USACE, 1987)**. The second supplement to the FEIS was prepared to examine the potential impacts associated with the barrier features of the NOV and identify an environmentally preferable and less costly alternative to the barrier plan presented in the FEIS. The barrier feature alternatives would provide protection from easterly storms striking the developed areas of the parish between City Price and Venice. Five alternatives were considered and three plans, west bank river levee, east bank barrier levee, and no-action, were retained for evaluation. The west bank river levee would involve the enlargement of the existing MRL to hurricane grade from City Price to Venice. The east bank barrier levee would consist of a barrier levee along the east bank from Bohemia to Baptiste Collette Bayou, and enlargement of the existing MRL from Fort Jackson to Venice. The no-action plan would be equivalent to the future conditions without the project. The west bank levee plan was recommended because it addressed the identified public concerns, made a better net positive contribution to the goal of NED, and was also the least environmentally damaging plan. The final of this second supplemental was filed with EPA on 4 December 1987.

4. **Mitigation Report, New Orleans to Venice Hurricane Protection Project (USACE, 1996)**. This document is the final mitigation report prepared for the NOV Hurricane Project. This 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.

5. **Other related NEPA documents**. A number of other NEPA documents have been conducted for Federal actions in the project area. These documents include:

a. **Individual Environmental Report #13, West Bank and Vicinity, Hero Canal Levee and Eastern Terminus, Plaquemines Parish, Louisiana**. Individual Environmental Report prepared by CEMVN.

b. **Environmental Assessment (EA) #433, U.S. Army Corps of Engineers Response to Hurricanes Katrina and Rita in Louisiana**. The EA was prepared by CEMVN. Finding of No Significant Impact (FONSI).

c. **Reach C Levee Enlargement – Borrow Site (II)**. The EA was prepared by CEMVN, 1987. FONSI.

d. **Reach C Levee Enlargement – Davant Borrow Site**. The EA was prepared by CEMVN, 1987. FONSI.

e. **Reach B-1 – Alternative Borrow Site**. The EA was prepared by CEMVN, 1986. FONSI.

f. **Reach C Levee Enlargement – Borrow Site**. The EA was prepared by CEMVN, 1986. FONSI.

6. **Other related projects and reports**. Louisiana's rapidly eroding coastal wetlands have been a concern for a number of years. A number of coastal wetland restoration projects have been planned or constructed within or adjacent to the project area. The projects described below address wetland losses in a portion of Barataria Bay. The CWPPRA (or "Breaux Act") provides for targeted funds to be used for planning and implementing projects that create, protect, restore, and enhance wetlands in coastal Louisiana. It was passed in 1990 and is authorized until 2019. The USACE administers accounting and tracks project status of all CWPPRA projects. The USACE also constructs approved CWPPRA projects whenever it is assigned as lead agency for a particular project. All other projects are constructed by one of four other Federal agencies (U.S. Fish and Wildlife Service (FWS), Natural Resources Conservation

Service (NRCS), EPA, National Marine Fisheries Service). Although the CWPPRA program is authorized through the year 2019, the funding source for the program (Sport Fish Restoration and Boating Safety Trust Fund) has not been renewed and may only have sufficient funding to support new construction projects for another 2 to 3 years.

7. **West Point a la Hache Siphon Diversion, Outfall Management, and Marsh Creation Projects**.

a. The West Point a la Hache Siphon Diversion project is located on the Mississippi River at Mile 49 above Head of Passes on the west bank of the Mississippi River at the community of West Point a la Hache. Completed by the state in 1992, eight 27-inch parallel siphons were constructed on the Mississippi River to divert water and associated sediments and nutrients into the flood-side wetlands on the west bank of the river. The siphons pass over the west bank MRL at the upper end of Section 5 of the NFL then go under State Route 23 before discharging into the flood-side marsh. The project is designed to counteract coastal wetland loss that has occurred in the area due to subsidence and saltwater encroachment by mimicking overbank flooding that historically occurred on the Mississippi River prior to levee placement. Operation began in 1993.

b. The outfall management project, designed to optimize the use of the fresh water and sediment supplied by the existing siphon by managing water flow through the outfall area is currently in the engineering and design phase with no tentative construction schedule. Maximum discharge capacity of the siphons is approximately 2,100 cubic feet per second (cfs). The NRCS is the Federal sponsor with the Louisiana Department of Natural Resources (LDNR) being the local sponsor.

c. The West Pointe a la Hache Marsh Creation Project, currently in the engineering and design phase with a projected construction completion date of late 2012, involves the use of hydraulically dredged sediments from the Mississippi River to restore and nourish approximately 350 acres of marsh habitat. The proposed placement site is existing open water habitat and intermediate marsh outside lower Section 4 and upper Section 5 of the NFL. The NRCS is the Federal sponsor with LDNR being the local sponsor.

8. **Naomi Siphon Diversion and Outfall Management Projects**. The Naomi Siphon Diversion project (also known as the La Reussite siphon), located at Mile 64 above Head of Passes on the west bank of the Mississippi River at the community of Naomi, Louisiana, is similar in purpose and function to the West Point a la Hache Siphon Diversion. Located at the boundary between Sections 1 and 2 of the NFL, the siphons pass over the west bank MRL and under State Route 23 before discharging into the adjacent marsh. Construction of the siphons was completed by the state in 1992. The outfall management portion of the project, designed to

optimize the use of the fresh water and sediment supplied by the existing siphon by managing water flow through the outfall area, was completed in 2002. The outfall management area lies outside lower Section 1 and upper Section 2 of the NFL in the vicinity of the open water area, "The Pen." Maximum discharge is approximately 2,100 cfs. The NRCS is the Federal sponsor with LDNR being the local sponsor.

9. **Lake Hermitage Marsh Creation Project**. The Lake Hermitage Marsh Creation project is located to the south and east of Lake Hermitage which lies outside Section 4 of the NFL. The project is designed to create 593 acres of wetlands, reduce tidal exchange in marshes surrounding Lake Hermitage, and reduce fetch and turbidity to promote submerged aquatic vegetation growth. The proposed project consists of utilization of hydraulically dredged Mississippi River sediments for marsh creation, creation of 25,000 linear feet of terrace, construction of 6,000 linear feet of rock dike, and placement of an earthen plug in an oil and gas canal. The FWS is the Federal sponsor with LDNR being the local sponsor.

10. **Delta Building Diversion at Myrtle Grove**. The Delta Building Diversion at Myrtle Grove located at Mile 59 above Head of Passes on the west bank of the Mississippi River at the town of Myrtle Grove, Louisiana, is a freshwater diversion project designed to restore wetlands outside Sections 2 and 3 and upper Section 4 of the NFL where they are being lost due to subsidence and saltwater intrusion. Potential project features include gated box culverts on the west bank of the Mississippi River and dredging of sediments from the Mississippi River for marsh creation in the project area. The project is currently in the planning stage with no tentative construction schedule. The USACE is the Federal sponsor with LDNR being the local sponsor.

11. **Mississippi River Sediment Delivery System – Bayou Dupont**. The Mississippi River Sediment Delivery System – Bayou Dupont Marsh Creation Project is a wetland restoration project that created approximately 500 acres of marsh using Mississippi River sediment. The EPA was the lead Federal sponsor for this project which was conducted under CWPPRA. The Louisiana Office of Coastal Restoration and Protection (OCRP) was the local sponsor and performed the engineering and design services.

12. The project location is approximately 4 miles northwest of Myrtle Grove in the Barataria Basin within Jefferson and Plaquemines Parishes, outside upper Section 2 of the NFL. The objective of the project was to create sustainable marsh using the renewable resource of Mississippi River sediment in a rapidly eroding and subsiding section of the Barataria land bridge. Approximately 2.3 million cubic yards of river sediment were dredged and pumped approximately 5 miles from the Mississippi River to the marsh creation area. The project was completed in March 2010 at a cost of approximately $28.8 million. An adjacent marsh creation increment of approximately 90 acres was also constructed utilizing $3 million from the National Oceanic and Atmospheric Administration (NOAA) Stimulus Funds Grant received by OCPR and additional CWPPRA funds.

13. **Mississippi River – Gulf Outlet (MRGO), Ecosystem Restoration Study, Louisiana and Mississippi**. The purpose of the study was to develop a comprehensive ecosystem restoration plan to restore the Lake Borgne ecosystem and the areas affected. A draft EIS for MRGO was completed on December 9, 2010, with a 45-day comment period commencing December 17, 2010. The Selected Plan would construct shoreline protection features along the Lake Borgne shoreline and restore and nourish wetlands in the MRGO and Lake Borgne estuarine complex.

14. **Louisiana Coastal Area Ecosystem Restoration Study (LCA)**. In 1989, Congress passed the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA, or "Breaux Act") creating a program to fund small scale, localized coastal restoration projects. By the late 1990s, it became apparent that CWPPRAs scope and funding, though very effective for implementing local projects quickly, was not adequate to address the large scale wetlands degradation. A much broader approach and substantially more resources would be necessary to reverse the breakdown of an ecosystem. With Coast 2050 as its blueprint, the Corps began the Louisiana Coastal Area Ecosystem Restoration Study in 1999. The LCA study was released for public comment in 2004. Before Congress could consider authorizing the plans recommendations, Hurricanes Katrina and Rita hit Louisiana in 2005. When WRDA 2007 was passed, it included authorization under Title VII for the LCA program and specific authorization for additional feasibility level reports. Six of the elements included in Section 7006 (e)(3)(A) as projects identified for additional study were:

- Convey Atchafalaya River Water to Northern Terrebonne Marshes
- Multipurpose Operation of the Houma Navigation Lock
- Amite River Diversion Canal Modification
- Small Diversion at Convent/Blind River
- Terrebonne Basin Barrier Shoreline Restoration
- Medium Diversion at White Ditch

15. Each of these six elements was required to have a feasibility study completed. In the course of initiating these studies, two elements were determined to be hydrologically intertwined and the planning efforts were combined:

- Convey Atchafalaya River Water to Northern Terrebonne Marshes
- Multipurpose Operation of the Houma Navigation Lock

16. The EISs for these near-term ecosystem restoration projects authorized by WRDA 2007 were released in October 2010.

DECISION TO BE MADE

3.19 This EIS identifies, evaluates, and screens various alternatives to incorporate the 32 miles of non-Federal back levees located on the west bank of the Mississippi River in Plaquemines Parish into the Federal levee system. The decision to be made is the selection of a plan to provide the authorized level of the hurricane protection project while maximizing efficiency, environmental sensitivity, and cost effectiveness.

LOCAL SPONSOR

3.20 Historically, PPG has been responsible for all NFLs and has served as the Corps local sponsor for Federal levees. Recent state legislation made the Coastal Protection and Restoration Authority of Louisiana (LACPRA) the local sponsor for Federal projects in Plaquemines Parish. The LACPRA is the newly formed state entity responsible for prioritizing and coordinating the state's coastal restoration and hurricane protection efforts. Thus, both PPG and LACPRA will serve as the non-Federal sponsors for the proposed project.

PUBLIC CONCERNS

3.21 During the two March 2007 public scoping meetings, approximately 20 members of the public and representatives from organizations submitted written and oral comments. During the 45-day public comment period for the draft version of this document, USACE held three separate public meetings in April 2011 to illicit public input. A detailed analysis of all written and oral comments identified seven categories of concern (Public Coordination, Appendix D):

- Levee alignment
- Buffer zone
- Levee height and maintenance
- Project material
- Project cost and duration
- Wetland and habitat
- Myrtle Grove resident concerns
- Other

3.22 Three categories (levee alignment, wetland and habitat, and project cost and duration) represent 70 percent of all submitted comments. These categories of comments and the 10 significant issues of concern that were identified during the analysis of scoping comments are described below. Further details about the public involvement process are found in Appendix D. Other public and agency comments are presented in a matrix in Appendix K.

Levee Alignment

3.23 **Use the Existing Levee Alignment**. The use of the existing levee alignment received the most comments throughout the scoping process. Various reasons supporting the use of the current alignment were described.

3.24 **Put the Levees Farther Away from the Population and Highway 23 to Protect as Much Land as Possible**. Protecting as much land as possible was also a major concern. Putting the levee as far away from Highway 23 as feasibly possible would protect the land that is already developed and would allow what little land is left to be developed.

Wetlands and Habitat

3.25 **Use the Best Alternative to Minimize the Impact to Wetlands**. Many comments stated that the New Orleans District should use the best alternative to minimize the impact to wetlands inside the levee along with the adjacent wetlands outside the levee.

Project Cost and Duration

3.26 **Concern about the Time of Completion and Cost of the Project**. Numerous comments were received about the amount of time it is going to take to complete the project and if it was going to be done in an expedited fashion. Also, numerous comments were raised about the cost of the project and adequate project funding.

Buffer Zone

3.27 **Building levees next to the road would reduce the area for temporary ponding if the levees were overtopped.** Buffer zone issues that should be addressed include how to manage ponding or the "puddle effect." If the levee is built next to the highway for much of its length and it gets breached, the amount of land available for floodwater storage would be much reduced. Less area available for storage would shorten the amount of time before the protected area fills with floodwater.

3.28 **Building spillways will help the puddle effect if the levee overtops.** Including spillways into the levee design to allow water to escape during flood events was suggested. If there is a breach and spillways are installed, the option of opening the spillways would allow the water to escape faster.

3.29 **Maintain a buffer zone between the levee and Highway 23.** Maintaining a buffer zone between Highway 23 and the levee would help protect all the remaining land and would allow the water more room to disperse if the levees were overtopped.

Levee Height and Maintenance

3.30 **The canal levee at Myrtle Grove is too low.** According to the public, the height of the levee at Myrtle Grove is 4 to 5 feet below the adjacent levees.

3.31 **The height of the entire levee should be 12 feet, especially at Myrtle Grove.** The entire levee from Oakville to St. Jude should be built at 12 feet, especially where the levee has been cut down at Myrtle Grove.

Project Material

3.32 **Where Will the Dirt and Material Used to Build or Repair the Levee Come From?** Most of the participants at the meetings were concerned about where the material to build the levee was going to come from and if the New Orleans District was going to haul the material in, use material from Plaquemines Parish, or dredge adjacent areas for material.

MYRTLE GROVE RESIDENT CONCERNS

3.33 Specifically, many public comments were received from residents of the Myrtle Grove Marina subdivision regarding potential impacts to their homes that would be induced by the proposed improvements to the non-Federal levees in Section 3. The tentatively selected plan, as outlined in this document, proposes to enlarge the existing levee around the Myrtle Grove Marina, shifting to the protected side. Some Myrtle Grove residents are concerned this plan will expose homes and potential homesites on the unprotected side to higher flood levels than would be the case if the existing levee was not modified.

3.34 In response to these comments, USACE has conducted preliminary modeling. Preliminary analyses indicate that increasing the elevation of the levee to the proposed design heights may increase the 1 percent annual chance-of-occurrence storm surge levels on the flood side of the levee by amounts up to 1.5 feet for the set of storms that was simulated. The magnitude is affected by the storm track, size, intensity, and the location along the levee. The difference in peak surge diminishes to 0 to 0.1 foot approximately 2 to 6 miles in distance from the proposed levee footprint. Results of an analysis of wave modeling with and without the proposed action in place indicate the change in wave heights could vary between 0 and 0.3 foot.

3.35 Residents have requested a floodgate across Wilkinson Canal be considered as an alternative to the current tentatively selected plan. Preliminary analysis by USACE suggests that a floodgate across Wilkinson Canal could impact up to 20 acres (above the tentatively selected plan) of saline marsh. Cost and environmental analyses are ongoing. If, in the future, USACE

decides a floodgate across Wilkinson Canal would be in the best interest of the Government, a supplemental EA will be conducted to determine the potential impact and appropriate additional environmental documentation that might be necessary.

INTERAGENCY COORDINATION

3.36 Recommendations provided by Federal and state agencies during the scoping process addressed a variety of broad natural resource issues. The U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and the Louisiana Department of Wildlife and Fisheries (LDWF) offered recommendations that fall into one of three categories:

- Avoid and minimize impacts to important natural resources.
- Investigate opportunities potentially benefiting the ecosystem.
- Support the restoration of coastal wetland resources.

3.37 Appendix D, "Public Coordination," presents more information regarding the input from these agencies during the scoping process. The recommendations are as follows:

1. **Avoid and Minimize Impacts to Important Natural Resources.**

a. **Investigate alternatives which avoid and minimize impacts to wetlands**. Section 5 describes various wetlands that are located along the unprotected side of the non-Federal levee and on the protected side at certain locations.

b. **Investigate alternatives which avoid and minimize impacts to tidal wetlands serving as essential fish habitat**. As described in Section 5, all habitats on the unprotected side of the non-Federal levee are designated as essential fish habitat. Such habitats support a number of commercially and recreationally important managed fisheries species and their life stages.

c. **Prioritize alternatives that avoid and minimize impacts to essential fish habitat higher than alternatives that would impact previously disturbed wetlands or non-tidal wetlands**. Wetlands on the protected side of the non-Federal levee are nontidal because they are not hydrologically connected with the coastal system and therefore do not serve as essential fish habitat. This recommendation pertains to levee alignments, sources of borrow for levee embankment material, and construction methods.

d. **Investigate the use of steel sheet piling to increase levee height as an alternative to increasing levee footprints**. Increasing levee footprints might otherwise affect wetlands or essential fish habitat.

e. **Increase levee footprints toward the protected side of the existing levee alignment to avoid impacts to tidal marsh and other wetlands outside of the protected system**. This pertains to alternatives where existing levee footprints are to be enlarged.

f. **Locate any on-site borrow areas within the protected side of the levee system and preferably within existing agricultural land and nonwet pasture areas**. Borrow outside of the existing alignment should be avoided because such areas serve as essential fish habitat.

g. I**f armoring or erosion protection of levees is needed, identify and evaluate potential effects of access routes and construction activities**. Armoring was not identified as a needed construction activity.

2. **Investigate Opportunities Potentially Benefiting the Ecosystem.**

a. **Locate new levee alignments on the development/nondevelopment interface to the maximum extent practicable**. Locating new levees at this interface may have the benefit of utilizing existing wetlands/undeveloped lands as a protective (coastal) buffer for the levee.

b. **Avoid enclosing large wetland tracts to the greatest degree practicable.** Hydrological connectivity of natural habitats such as wetlands with the Mississippi River or tidal coastal system is ecologically important and maintaining or providing this connectivity in association with the investigation of new levee alignments is desirable.

3. **Support Restoration of Coastal Wetland Resources.**

a. **Proposed project features should not prohibit the construction of coastal wetland restoration projects in the project area**. In particular, project features should not prohibit the possible enlargement of the existing siphons at Naomi or features proposed for the Myrtle Grove Sediment Diversion.

b. **Consider non-structural design alternatives to create or nourish (e.g., dedicated delivery) a marsh buffer along the unprotected side**. The construction of marsh or forested berms along the unprotected side could provide protection of the levee during storm events and minimize maintenance needs for the levee in lieu of traditional rock/concrete armoring. Likewise, construction of marsh or forested berms might also help to compensate for any unavoidable project-related losses of marsh or coastal bottom-land hardwood forests.

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4. ALTERNATIVES

WITHOUT-PROJECT CONDITION (NO FEDERAL ACTION)

4.1 The non-Federal levee (NFL) project consists of approximately 32 miles of levees along the west bank. The NFL received extensive damage during Hurricanes Katrina and Rita and following these events was authorized for replacements and modifications needed to be incorporated into the New Orleans to Venice Federal project. The NFL project is divided into five distinct levee reaches, or sections, for planning purposes, and they are labeled 1, 2, 3, 4 and 5 (described below). Currently, the levee heights vary throughout the NFL alignment. In the northern parish, approximately 8 miles of the project are at elevation 8 feet, National Geodetic Vertical Datum (NGVD), whereas to the south approximately 24 miles of the alignment are at elevation 5 feet, NGVD, or less and nearly 2 miles of the project are at ground level. The distance between the Mississippi River and the NFL varies from approximately 1,000 feet (where the levee is immediately adjacent to LA-23) to approximately 3 miles.

4.2 The Plaquemines Parish NFL system is operated and maintained by private landowners and the Plaquemines Parish Government, as the governing authority of the Plaquemines Parish West Bank Levee District (PPWBLD). The PPWBLD is also responsible for some of the pump stations, floodgates, control structures, canals, and a number of freshwater siphons within the Plaquemines Parish protected area. This levee has not received extensive repairs from Hurricane Katrina related damages. A detailed description of each levee section, or reach, is provided below.

1. **Section 1 – Oakville to La Reussite, Louisiana.**

a. The northern terminus of the existing NFL is at Oakville (near River Mile (RM) 70.5), just south of Belle Chasse, Louisiana.

b. Section 1 extends 7 miles (approximately 42,000 linear feet) south to La Reussite (near RM 64.0) where Section 2 begins.

c. Maximum elevation of existing levees is elevation 9 feet, NGVD.

d. Includes one pump station (Ollie).

e. The area protected by this section levees is approximately 3,000 acres and contains numerous residential ownerships in the communities of Oakville, Jesuit Bend, Ollie, Gloria, Naomi, and La Reussite.

f. The area enclosed by this levee system is comprised of primarily residential and agricultural land, with some cypress-tupelo swamp, wet bottom-land hardwoods, and dry bottom-land hardwoods.

2. **Section 2 – La Reussite to Myrtle Grove, Louisiana.**

a. Connects to Section 1 at La Reussite and Section 3 at Myrtle Grove.

b. Levee is 11 miles in length (approximately 62,000 linear feet) and protects over 6,600 acres.

c. Levee is primarily privately owned and maintained.

d. Maximum elevation of the current earthen levees is 8 feet, NGVD.

e. The protected area is drained by two pump stations--a siphon in the north and the Wilkinson Canal Pump Station in the south.

f. The area is protected by the NFL levees includes the communities of Alliance, Ironton, and Myrtle Grove, as well as the Conoco Phillips refinery.

g. Major landowners in this area are Conoco Phillips and citrus growers. The Conoco Phillips refinery is a major employer in the Parish, employing approximately 400 people. The citrus industry in the parish is valued annually at approximately $12 million.

h. The area enclosed by this levee system is comprised primarily of open pastureland, some of which is considered to be wetland. There are small amounts of wet and dry bottom-land hardwoods.

3. **Section 3 – Myrtle Grove to Citrus Lands.**

a. Connects to Section 2 at Myrtle Grove and Section 4 at Citrus Lands (near RM 56.5).

b. Existing levees are approximately 3 miles in length and protect 750 acres. Approximately one-half of the levee system in this section is immediately adjacent to LA-23.

c. Levees are privately owned and maintained to a maximum elevation of 6 feet, NGVD.

d. The area protected by the levee includes primarily open pastureland and a coal stockpile yard.

4. **Section 4 – Citrus Lands to Pointe Celeste, Louisiana.**

a. Ties into Section 3 at Citrus Lands and Section 5 south of Point Celeste (near RM 52.0).

b. Existing levee alignment is 8 miles long (approximately 47,000 linear feet) and protects approximately 6,000 acres.

c. Maximum elevation of the levees is 6 feet, NGVD.

d. Levees are privately owned and maintained.

e. There is a pump station at Point Celeste.

f. The area is primarily open pasture/agricultural land. Wetlands within this section include an area of wet subsiding ridge and scattered areas of wet pasture.

5. **Section 5 – Pointe Celeste to St. Jude, Louisiana.**

a. Ties into Section 4 south of Point Celeste and terminates at the NOV back levee near St. Jude (near RM 46.0).

b. The existing levees extend for approximately 1 mile, but the entire reach is approximately 3 miles long (16,000 linear feet). There is no existing back levee for a distance of approximately 2 miles from the southern terminus of the existing NFL to the northern terminus of the Federal levee near St. Jude.

c. The levee is privately owned and maintained to a maximum elevation of 4 feet, NGVD.

d. The protected area west of LA-23 is relatively small and currently includes a Plaquemines Parish maintenance building and equipment.

e. There are small areas of dry bottom-land forest within the levee-protected area. Where there is no existing back levee, wetlands occur on the west side of LA-23, including scrub-shrub wetlands and coastal marsh.

PLANS CONSIDERED IN PRELIMINARY ANALYSIS

4.3 In the preliminary analysis, a number of alternative alignments and different structural methods of risk reduction and nonstructural measures were formulated to address hurricane damage reduction for the project area. These alternatives were evaluated based on the following criteria—engineering effectiveness, economic efficiency, and environmental and social acceptability—in determining project feasibility. Preliminary structural and nonstructural option plans are discussed in the following paragraphs.

Nonstructural Alternatives

4.4 The WRDA 1986 requires that any Federal agency planning projects that involve flood protection give full and equal consideration to nonstructural alternatives to prevent or reduce flood risks. Nonstructural alternatives would include options that might significantly reduce flood damage without the construction of major flood risk reduction structures. Flood risk reduction from nonstructural measures may be achieved from nonstructural measures by changing the use of the flood plain or by accommodating the uses to the flood hazard. In addition, according to Engineer Regulation (ER) 1105-2-100, nonstructural measures can be considered independently or in combination with structural measures (USACE, 2000).

4.5 The nonstructural measures evaluated to achieve flood-risk reduction for the project area included structure relocation, raising structures, floodproofing, and regulation of the flood plain. Methodology for nonstructural evaluations involves various components such as structure types, implementation costs for each feature based on FEMA guidance and flood depths. For this analysis, nonstructural alternatives were evaluated independently and in combination with structural alternatives to determine engineering effectiveness, economic efficiency, and environmental and social acceptability. Results of the evaluation concluded all the nonstructural measures and/or their combination options to be cost prohibitive and infeasible due to engineering concerns. Their project effectiveness was significantly lower when compared to structural alternatives for levees. Therefore, nonstructural options were eliminated from further consideration as viable alternatives in this EIS.

1. **Structure Relocation.**

a. One way to reduce damages from storms and hurricanes would be a mandatory public acquisition of properties in areas subject to flooding. This would be done pursuant to the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 USC Section 4601, et seq., as amended (the Uniform Act), for financial assistance for subject properties. Accordingly, a nonstructural program based on acquisition of commercial and residential properties in flood-prone areas would be subject to these guidelines, including payment of just compensation for the acquired properties and payment of Uniform Relocation Assistance Benefits under Title II of the Uniform Act for the displacement of individuals, families, businesses, farms, and nonprofit organizations. Two primary options exist under this alternative: (1) relocation of the structure to a comparable site outside the area of flooding; and (2) acquisition of the structure and site by the local sponsor for demolition and relocation. Buyout costs for approximately 1,275 residential structures in the immediate vicinity could exceed $180 million (1,275 x $144,000), and relocation costs under the Uniform Relocation

Assistance Act could total an additional $20 million. In addition, under Public Law 91-64, individuals (or occupants) are compensated up to $25,000 per structure for relocation costs. This equates to an additional $32 million in implementation costs. These costs include moving, storage, rent differential, temporary housing, and compensation for relocation. Altogether, average structure relocation costs are estimated to exceed $231 million (i.e., the total cost of acquisition, relocation, and compensation). Under this alternative, the affected property owners would relinquish title to their existing lot in exchange for ownership of the property to which they were relocated. This option, individually or combined with other features, is both cost prohibitive and not favored among local interests.

b. No new use value would be attributed to the vacated lands. No value would be associated with reduced damages to public property, such as roads and utilities. Minor reduction in emergency services costs would be gained. Any reduction in administrative costs of the National Flood Insurance Program (NFIP) and disaster relief programs is anticipated to be minimal (i.e., less than 1 percent).

c. While environmental benefits of a buyout in the study area initially appear to be attractive, more detailed analyses of the potential benefits cannot support a positive recommendation for an acquisition/relocation plan. The study area already has a significant amount of open space in, and adjacent to, the developed areas. Bayou Segnette State Park, located near the study area, is among the significant recreation resources cited in the State Comprehensive Outdoor Recreation Plan (SCORP) that meets the area's active recreation needs.

d. Restoring the ecosystem through the acquisition of flood-prone structures would generate benefits, but it is highly unlikely that these benefits would be sufficient to justify the approximate $200 million cost of the relocation of all structures in the SPH flood plain, or the scaled costs of smaller relocation efforts. Establishing Federal, state, or regional significance would be problematic because there are no designated habitats for Federal or state listed species within or near the study area. Regarding the Other Social Effects (OSE) and Regional Economic Development (RED) Accounts, the social and economic impacts resulting from the necessary displacement of 1,275 households, 20 businesses and public buildings, the demolition of an equivalent number of buildings of all types, and the removal of tens of millions of dollars in property value and tax base would have significant negative effects on the local economy. The plan would also generate significant local controversy, disrupt community cohesion, and place economic burdens on relocated families, relatives, and neighbors.

e. For the reasons cited previously, it is unlikely that a flood plain buyout plan would meet Principles and Guidelines (P&G) guidelines (Economic and Environmental P&G for Water and Related Land Resources Implementation Studies). Additionally, the buyout plan would not provide significant offsetting environmental or economic benefits and would have negative effects on the RED and OSE Accounts. Therefore, acquisition of flood-prone structures was eliminated from further consideration.

2. **Raise in Place.** This form of floodproofing would require elevating all commercial and residential properties subject to flooding in the study area above the SPH level event. Also, certain infrastructure required to be operational during a flooding event might have to be raised (i.e., roadways, public buildings, and certain utilities). In addition, apartment, commercial, and other nonresidential buildings would need to be raised, along with selected utilities and infrastructure. Moreover, certain critical infrastructure (such as highway escape routes) would require raising, resulting in large cost expenditures. Structure raising elevates the structure above the floodwater enough that the FFE cannot be damaged by the design flood event. Due to the expense and engineering design, structure raising is generally not a feasible alternative for most nonresidential structures, but can potentially be viable in protecting moderately valued residential structures. However, the cost of raising a structure, which is based on the structure's flood depth, is highly dependent upon the construction material of each structure and type of structure foundation. Structures with slab foundations and basements are more costly to raise than structures constructed on piers. Also, under Public Law 91-64, individuals (or occupants) are compensated up to $25,000 per structure for any relocation costs during implementation of the measure (resulting in $32 million alone). In the evaluation of structure raising costs, this option was determined to be too expensive to implement both individually and in combination. Thus, structure raising was eliminated from further consideration.

3. **Floodproofing.** Floodproofing reduces flood damages through modifications to structures and relocation of building contents. Floodproofing techniques involve keeping water out of the structure, as well as reducing the effects of inundation. Nonstructural adjustments, such as the elevation of structures, can be applied by an individual or as part of a collective action either when flood-prone buildings are under construction or through retrofitting of an existing structure. Floodproofing measures can be applied to both residential and nonresidential structures to reduce the risk of impacts from flooding. This includes homes; apartments; and commercial, industrial, and public buildings constructed of brick, frame, or metal. Residential and nonresidential floodproofing is used to prevent or obstruct the amount of floodwater that can enter a structure, thereby minimizing damages. Among the costs associated with floodproofing are sealing entryways, using sump pumps, and/or adding sewer valves. Sealing entryways can also be accomplished by constructing door closures, window closures, and barriers to potential wall openings and/or installing sealants to walls and floors. The costs are tallied on a structure-by-structure basis, depending on the number and sizes of windows, doors, and vehicular doors which are correlated with the depth of flooding for each structure. These measures include both wet and dry floodproofing measures. All of the aforementioned features are computed collectively on each structure, as well as in combinations. It was also determined the majority of structures would require costly raising (estimated at an average cost of $95 per square foot (USACE, 2007a)) and in addition, many would qualify for compensation costs under Public Law 91-64. The nonstructural floodproofing was determined to be prohibitively expensive. Thus, since a majority of structures would require costly raising, associated compensation floodproofing options were eliminated from further consideration.

4. **Flood Plain Zoning.** Through proper land use regulation, flood plains can be managed to ensure that their use is compatible with the severity of a flood hazard. Several means of regulation are available, including zoning ordinances, subdivision regulations, and building and housing codes. Their purpose is to reduce losses by controlling the future use of flood plain lands. Plaquemines Parish already participates in the NFIP and manages flood plain land uses consistent with the program. However, a majority of the buildings in the study area flood plain were built prior to the adoption of NFIP zoning standards and are not subject to current flood plain zoning regulations unless they are substantially improved. [IER 16] Therefore, zoning cannot be considered independently as a long-term mitigation solution for flood damage reduction to existing structures.

Structural Alternatives

4.6 The following standard set of structural levee alignment alternatives and scales within these alignments were initially considered for each of the five reaches of the project area.

Alignment Alternatives
- Existing alignment with straddle (toe-to-toe widening occurs equally on the protected and flood sides of the levee)
- Flood-side shift (all toe-to-toe growth occurs on flood side of levee)
- Protected-side shift (all toe-to-toe growth occurs on protected side of levee)
- New structural alignments

Geotechnical Alternative Scales
- Earthen Levee
- Floodwall
- Earthen Levee with Floodwall
- Earthen Levee using Geotechnical Fabric
- Earthen Levee using Deep Soil Mixing

4.7 In addition to this standard set of action alternatives common to all reaches, different structural scales or combinations of scales were formulated to address reach-specific opportunities and constraints.

4.8 A range of acquisition options for obtaining borrow material to be used for construction of levee replacement or modification are possible.

Borrow Material Alternatives
- Government-Furnished Borrow Material
- Contractor-Furnished Borrow Material
- Supply Contract Borrow Material

4.9 Once a full range of scales was established for each reach, a preliminary screening was conducted to identify those scales that would proceed through detailed analysis. The criteria used to make this determination included engineering effectiveness, economic efficiency, and environmental and social acceptability. Those scales that did not adequately meet all of these criteria were considered infeasible and therefore were eliminated from detailed study in this EIS.

4.10 The remaining feasible scales, or combinations of scales, were combined to create the alternatives for detailed evaluation in the EIS.

Levee Alignment Alternative Development

4.11 The New Orleans District conducted a concept level study to formulate and evaluate various structural alternatives for raising and bringing certain existing NFLs into the Federal system as part of the NOV Hurricane Protection Project (USACE 2008a, 2008b). The study provides preliminary engineering services to support the evaluation of a total of 22 alternative levee alignments. Three or more alternative alignments were considered in this study for each reach or section of the NFL system.

4.12 This study provides a preliminary engineering and design (PED) of each alternative alignment, describes the alternatives considered for each of the project area's five reaches or sections, and assists in comparing and screening the alternatives formulated for each reach or section. The study consists of a final Engineering Alternatives Report (EAR) (USACE, 2008a) and a supplement to the final EAR (USACE, 2008b).

4.13 The USACE has interpreted the intent of the project's congressional authorization and its role in serving to constrain alternative development. It was determined that the existing levee alignment is the starting point of any analysis to provide increased levels of protection to the NFL system, provided that following the existing alignment is feasible, constructible and environmentally sound, as determined by the EAR. If not, the only other alignment to be considered would be the one closest to the current alignment that is within the constraints of cost and environmental impacts. As a result, the PDT optimized the existing levee alignment. Deviations from the existing alignment would be primarily due to specific engineering or environmental conditions that were identified.

Borrow Materials Options

4.14 Earthen levee construction requires a specific type of clay material which compacts well and prevents seepage. This material has specific requirements related to the amounts of sand, organic material, etc. 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.

4.15 Approximately 29,048,000 cubic yards of noncompacted clay would be required to modify the entire NFL system to the 2 percent LORR. Four potential contractual alternatives for obtaining material were evaluated. These included the no action, use of Government-furnished borrow material, use of contractor-furnished borrow material, and the use of borrow material procured from a supply contract.

4.16 No Action. Under the no-action alternative, borrow areas would not be obtained to provide material needed for upgrading the levee system, as no replacement or modification to the NFLs would be made.

4.17 Government-Furnished Borrow Material. Under this method, the Government first identifies the borrow source location, then investigates and approves the borrow material as suitable for use. Borrow material is normally acquired 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 specific contract, based on a borrow analysis. The following updated list of approved Government-furnished borrow areas will be considered: 1418/1420 Bayou Road; 1572 Bayou Road; 4001 Florissant; 910 Bayou Road; Belle Chasse NAS; Triumph East; Bonnet Carre South; Brad Buras; Cummings North; Dockville; West Bank I; West Bank F; Tabony; Bonnet Carre North - Phase 2; West Bank E - Phase 1; West Bank E, Phase 2; West Bank D; Tac Carrere; Stumpf - Phase 1; Stumpf - Phase 2; Johnson/Crovetto; and Bazile. The NEPA process for potential Government-furnished borrow sources has been previously documented under several Individual Environmental Reports (IER), including IERs 18, 22, 25, and 28. Prior to any borrow acquisition, USACE will review the existing environmental documentation to ascertain if additional impact analysis or agency coordination will be necessary. If so, USACE will produce an updated Environmental Assessment for that particular borrow area. The acquisition of the real estate interest over the land is made in the name of the NFS.

4.18 Contractor-Furnished Borrow Material. In this scenario, the Government requires a contractor to provide their own borrow material. The contractor has the burden of demonstrating that the borrow material is geotechnically suitable and that excavation would avoid Section 404 jurisdictional wetlands; Federally listed threatened or endangered species; significant cultural resources; and areas of hazardous, toxic, or radiological concern. The contractor enters into a contractual agreement with the landowner, rather than the Corps, to acquire the borrow material.

4.19 Supply Contract Borrow Material. Under this alternative, supply contractors bid on task orders issued by the Government for the supply of borrow material to be used by the Corps and other contractors for construction of hurricane and storm damage reduction system projects. The Supply Contract would allow a private individual(s) or corporation(s) to deliver a prespecified amount of suitable borrow material from an area(s) anywhere in the United States where suitable borrow material could be acquired. The individual(s) or corporation(s) would deliver the borrow material to a designated location for use by a New Orleans District construction contractor.

4.20 Construction Staging Areas and Access Roads. Staging areas for the temporary storage of construction materials and access roads will be needed at various locations throughout the project area. The two main criteria for selecting staging and access route location where (1) the locations must not contain wetlands, as determined in the USACE/FWS 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 to cultural resources documented during the cultural resources survey. The results of the surveys were included in a report, "Cultural Resource Investigations for the Non-Federal Levees Project West Bank of the Mississippi River, Plaquemines Parish, 2009." Temporary staging areas will be located in previously converted nonwetland areas in close proximity to construction, and access roads were located on existing parish transportation routes. The locations of these areas are depicted in Figure 4.1. If during construction it is determined that staging areas and access or haul roads will be situated outside the areas of analysis then supplemental environmental documentation will be necessary.

ALTERNATIVE EVALUATION PROCESS

4.21 The *Military Decision Making Process (MDMP)* is a planning model that establishes procedures for analyzing a mission; developing, analyzing, and comparing courses of action (COA) against criteria of success and each other; selecting the optimum COA; and producing a plan or order. The MDMP applies across the spectrum of conflict and range of military operations. The MDMP helps organize the thought process of commanders and staffs. It helps them apply thoroughness, clarity, sound judgment, logic, and professional knowledge to reach decisions.

4.22 While the full MDMP has practical applications for the Corps, its use in the Civil Works process can be pared down for its strict application to selecting a recommended alternative. The process can be simplified from the military approach and converted to a project management business process format called the "Alternatives Evaluation Process" (AEP). The AEP process guides Project Delivery Teams (PDT) through a logical systematic process for choosing a recommended alternative amidst sometimes competing and complex criteria.

4.23 During the AEP process, alternatives are only considered if they meet the following criteria—feasible, acceptable (timely and cost effective), suitable, and complete.

4.24 Later in the process, alternatives that are being considered are compared to each other in relation to risk and reliability, environmental impacts, design and construction duration, design and construction costs, and any other factors identified by the PDT. The analysis step of the AEP entails weighing the advantages and disadvantages of each alternative with regard to the criteria. The alternative comparison step of the AEP entails comparing the alternatives against each other with respect to the advantages and disadvantages that have been identified for each criterion. Priority is assigned to each criterion in order to aid in the decisionmaking process. At this point in the AEP, the preferred alternative can be selected, and the study may move forward.

Figure 4-1. Temporary Staging Areas and Access Roads.

PLANS ELIMINATED FROM FURTHER STUDY

4.25 During the preliminary stages of this study, a total of 22 proposed levee alignment routes were identified that would meet project objectives. Three or more alternative alignments were developed for each of the five sections of the levee system.

4.26 Each of these 22 individual levee alternatives were laid out to:

1. Observe the proposed typical levee cross sections as they are being applied along the proposed levee alignment alternatives.

2. When the size of the levee footprint prohibits it to be used for a hurricane protection system (HPS), a concrete T-wall is used as an HPS.

3. Minimize impact to existing residential or commercial structures.

4. Minimize encroachment of construction activities to wetland areas both outside and inside the existing levee system.

5. Minimize impact to existing stormwater drainage canals.

6. Conserve accessibility to future flood-side residential area or commercial communities by providing roadway ramps or vehicular swing gates.

4.27 For each levee section, one alternative was identified that would maintain the existing levee alignment, only deviating for engineering purposes. Other alignments were identified for each section that deviated from the existing levee alignments to varying degrees. These deviations were based on reducing levee length, minimizing environmental impacts, and/or avoiding residential or industrial areas. Rudimentary designs were prepared for each of the 22 proposed levee alignments, allowing team members to estimate Relative Order of Magnitude cost and environmental impacts. Utilizing these estimates, team members identified the most desirable alignment alternatives that would be considered in further detail in the AEP process.

4.28 The Corps has determined that the project's congressional authorization did not allow deviating from the current alignment in the absence of an engineering reason, the results of the AEP were no longer pertinent. The Corps recognizes that one or more of the proposed levee alignments would have resulted in reduced environmental impacts than the tentatively selected plan. However, it was outside the Corps authority to further investigate these options since they deviated from the existing alignment for nonengineering purposes. From this point, the Corps moved forward with only investigating levee modifications that would not deviate from the existing alignment.

PLANS CONSIDERED IN DETAIL

Description of Alternatives

4.29 The objective of the plan formulation process was to identify a final list of levee modification options from each of the project area's five reaches and sections and arrange them into plan alternatives that would provide enhanced storm surge protection and protect evacuation routes along the west bank in Plaquemines Parish. Three action alternatives were developed in addition to the No-Action Alternative:

1. Alternative A, the No-Action Alternative, would do nothing to modify the NFL for the purpose of providing enhanced storm surge protection and protect evacuation routes.

2. Alternative B would modify the existing levee sections to the designed height of 2 percent LORR and incorporate Sections 1 through 5 of the NFL into the Federal hurricane and storm protection system by employing alignment alternatives which closely follow the existing levee alignment, only deviating from existing alignment for engineering purposes.

3. Alternative B2 (NFS Optional Alignment) would modify and incorporate the NFL into the Federal hurricane and storm protection system by employing alignment alternatives which closely follow the existing levee alignment in Sections 2 through 5, with the levee grades being higher in Section 1 to reflect the NFS LPP. Sections 2 through 5 of Alternative B2 would be identical to Sections 2 through 5 of Alternative B. Any cost increase over and above Alternative B would be paid 100 percent by the local sponsor.

4. Alternative C would modify the existing levee sections to the designed height of 2 percent LORR and incorporate Sections 1 through 3 of the NFL into the Federal hurricane and storm protection system by employing alignment alternatives which closely follow the existing levee alignment. At the end of Section 3, the levee is designed to turn 90 degrees to the east to tie in to the existing MRL. Sections 4 and 5 would not be raised to the 2 percent LORR due to insufficient funds. In the event additional funding was appropriated to complete the project, Sections 4 and 5 would then later be incorporated into the Federal hurricane and storm protection system utilizing the same alignment as Alternatives B and C.

4.30 Alternatives B, B2, and C, the "action alternatives," include a variety of construction features associated with modifying the NFL system. Each action plan, excluding Alternative C, would incorporate 32 miles of existing NFL system into the Federal levee system and construct from ground level 2 miles of earthen back levees (Figures 4-2 through 4-5).

4.31 The following standard set of levee alignment alternatives, and scales within these alignments, were initially considered for each of the five reaches of the project area.

Figure 4-2. Levee Alternatives of Section 1, Oakville to La Reussite.

Figure 4-3. Levee Alternatives of Sections 2 and 3, La Reussite to Myrtle Grove.

Figure 4-4. Levee Alternatives of Sections 3 and 4, Myrtle Grove to Point Celeste.

Figure 4-5. Levee Alternatives of Section 5, Point Celeste to St. Jude.

1. Existing alignment with straddle (toe-to-toe widening occurs equally on the protected and flood sides of the levee).

2. Flood-side shift (all toe-to-toe growth occurs on flood side of levee).

3. Protected-side shift (all toe-to-toe growth occurs on protected side of levee).

4. New structural alignments.

4.32 Whenever possible, levee enlargement activities were designed as a protected-side shift in order to avoid and minimize impacts to wetland habitats. In the event that conditions existed (such as residential areas or interior freshwater canals) that prohibited a protected-side shift, a straddle or flood-side shift was necessary and unavoidable. The marsh and wetland impacts created by these construction activities were determined using the Wetland Valuation Assessment (WVA) methodology, as agreed upon by the interagency PDT. These unavoidable adverse impacts to wetlands will be compensated as outlined in the mitigation plan (Appendix J). Once mitigation sites have been identified, a site-specific mitigation work plan will be coordinated as a supplemental environmental document.

1. **Section 1**. An earthen levee with an enlargement flood side (FS) along the existing NFL alignment. The FS shift, while impacting wetlands, is necessary due to an existing adjacent protected side canal and avoids relocation of nearby FS homes. Potential impacts to the human population include an estimated 2,246 residents, 776 homes, and 6 communities (detailed tracts, Census, 2000).

2. **Section 2**. An earthen levee with a protected side (PS) enlargement along the existing NFL alignment, except shifting to the PS in one area where deep channels form sharp and unusual bends in the existing NFL alignment, would have been unacceptable from an engineering perspective. Potential impacts to the human population include an estimated 211 residents, 72 homes, and 3 communities.

3. **Section 3**. An earthen levee with a PS enlargement along the existing NFL alignment. It is possible that a tie-in to the MRL (Alternative C) may be required near the end of Section 3, depending on the cost of construction prior to that point. Potential impacts to the human population include an estimated 7 residents and 13 homes.

4. **Section 4**. An earthen levee with a PS enlargement along the existing NFL alignment in the northern area of the subsided ridge and continuing south along the existing NFL alignment with a PS enlargement until reaching the southernmost portion of Section 4 with an alignment shifting toward LA-23. Potential impacts to the human population include an estimated 100 residents, 76 homes, and 1 community, Pointe Celeste.

5. **Section 5**. An earthen levee with a PS enlargement along the existing NFL alignment and then continuing along LA-23 for the remaining southern 2 miles. Potential impacts to the human population include an estimated six residents, three homes, and one community, St. Jude.

5. AFFECTED ENVIRONMENT

INTRODUCTION

5.1 The Federal Council on Environmental Quality (CEQ) regulations (40 CFR Part 1500 *et seq*.), promulgated to implement the National Environmental Policy Act, provides guidance for the preparation of Environmental Impact Statements (EIS). As stated in Section 1502.15 of the CEQ regulations, the Affected Environment section shall contain data and analysis "commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced."

5.2 This section of the EIS places emphasis on two areas of the affected environment—its socioeconomics and biological resources (including wetlands). These existing resources, broken into subtopics, are discussed by how they could be affected by potential weaknesses or failures in the existing levee systems during intense rainfall or high-water events. The environmental consequences of implementing proposed alternatives to avoid potential levee deficiencies will be discussed in Section 6 of the EIS according to the potential impacts they may have on selected socioeconomic and biological resources.

5.3 The second major environmental issue pertaining to the project area and described in this section is biological resources. Louisiana's coastal areas are economically, recreationally, and ecologically important to the region and the entire country. The loss and restoration of coastal wetlands have been issues of major importance for years. In addition, the levee-protected area supports a variety of wetlands that are home to a variety of plants and animals and are within a major flyway for migratory birds. Emphasis is placed on those existing biological resources potentially affected by the alternative actions.

LAND USE

5.4 Although the land protected by the existing non-Federal levee (NFL) along the west bank contains several communities, it is largely rural. Its largest category of land use comprises agricultural land as shown in the Plaquemines Parish land use map of the project area (Figure 3-1, Section 3 of the EIS). These lands are mostly used for agricultural production for pasture, raising cattle, and citrus groves.

5.5 The next largest land use type in the project area is industrial which exists in every section (or reach) of the project area except Section 4. Among the industrial uses, which are very important economic resources within the immediate vicinity of the NFL, include waterborne commerce along the Mississippi River and Port of Plaquemines; a segment of the Mississippi River and Tributaries (MR&T) levee system that extends as far north as Missouri and as far south as the Gulf of Mexico; the production, refining, and/or transport of crude petroleum, natural gas, coal, and other important natural resources; and commercial fisheries.

5.6 Residential is the third type of land use identified in the NFL project area. Although the majority is located in Section 1 along LA-23 from Oakville to the community of Naomi, there are nine other rural communities, or sites, located in the impact area, but they comprise a very small portion of the total residential land use. In fact, their allocation is so small that they are not designated on the land use map and, according to the U.S. Bureau of Census, have population counts of less than 100 people. From north to south starting below Naomi, these include La Reussite in Section 1, Alliance and Ironton in Section 2, Myrtle Grove and Citrus Farm in Section 3, Point Celeste in Section 4, and St. Jude in Section 5.

5.7 The last land use type, shown in Figure 3-1 (Section 3 of the EIS) as civic or institutional, basically represents public property types. It only accounts for a small percentage of the total land use in Sections 1 and 4 of the project area.

CLIMATE

5.8 The project area and Plaquemines Parish falls within the gulf coast regional climate which is characterized as hot, humid, and subtropical (Ning, et al., 2003). The maritime tropical air masses associated with the Gulf of Mexico and the many water surfaces of rivers, canals, lakes, and waterways in the area significantly influence the local climate. Summers are long and hot with high temperatures and humidity. Tropical storms often enter the Gulf in the summer and fall and can generate extensive rainfall and high winds. The area receives approximately 65 inches of precipitation annually. The summer average daily temperature is 81 degrees F, with the average daily high temperature around 90 degrees F. During winter, cold, dry, polar air masses often move southward from Canada, influencing the project area. Winter average daily temperature is 54 degrees F, and the average daily minimum is 44 degrees F.

5.9 Tropical storms and hurricanes frequent the region, specifically between August and October. These storms bring high winds (capable of exceeding 155 miles per hour), heavy precipitation, and storm surges that cause extensive flooding, property damage, environmental devastation, and loss of life (National Hurricane Center, 2007).

5.10 Regional climate trends show that over the past decade Louisiana has been subject to increasing temperatures and humidity, increasing precipitation and more intense precipitation events, stronger tropical storms, and a rising sea level (Ning, et al., 2003). Climate modeling efforts to predict future hurricane frequency are currently inconclusive; however, the currently supported climatic trends listed above are generally agreed to result in future increases in flooding, erosion, and subsidence, specifically to coastal areas (Ning, et al., 2003).

PHYSIOGRAPHY AND GEOLOGY

5.11 The project area is located within the Central Gulf Coastal Plain. More specifically, the area is situated on the Deltaic Plain of the Mississippi River in a region of extremely low relief. Dominant physiographic features in the vicinity of the project area include the Mississippi River, its natural levees and abandoned distributaries, and the marshlands and bodies of water that lie between the natural levees.

5.12 The underlying geology of the study area is composed of extremely young sediment deposited by the Mississippi River and various tributaries. Exposed surfaces are typically Quaternary Holocene alluvial and coastal marsh deposits (Louisiana Department of Conservation, 1953). The alluvial deposits are primarily sand, gravel, and rich muddy organic matter. The coastal marsh deposits are composed chiefly of muddy organic matter (Louisiana Department of Conservation, 1936). The historic river system freely deposited sediments, flooded annually, and continually changed course. These historic processes were responsible for the continual formation and maintenance of the Lower Mississippi Delta Region; however, due to human influences, these processes no longer occur with the frequency needed to maintain the land masses in their current state. Levee construction has created a permanent unwavering path for the Mississippi River and has greatly limited overbank flooding. Without sediment inputs from flooding, the Lower Mississippi Delta Region is subject to erosion from coastal outwash and experiences high levels of subsidence due to surface drying. Currently, because of the channeled nature of the Mississippi, the majority of the sediment is carried further into the Gulf of Mexico where it settles.

TOPOGRAPHY

5.13 Natural ground elevations in the vicinity of the project area range from approximately 5 to 7 feet, National Geodetic Vertical Datum (NGVD), along the natural levees of the Mississippi River to approximately 0 feet in low areas between the natural levees. Adjacent coastal marshlands vary in elevation from approximately 2 to 0 feet, NGVD. Protected lands on the west bank of the Mississippi River generally slope westward away from the river. Ground elevations in the area protected by the existing NFL generally range from approximately 5 feet, NGVD, along the natural river levee to approximately -5 feet, NGVD, in the lowest areas.

5.14 The height of the NFL back levee system extending from Oakville to St. Jude varies considerably, with elevations in the northern areas averaging approximately 8 feet, NGVD, and elevations in the southern areas averaging less than 5 feet, NGVD.

5.15 Subsidence in the Louisiana coastal zone, including the Mississippi River delta south of New Orleans, involves both sea-level rise and the general lowering of the land surface because of different natural and human-induced factors. In the New Orleans area, subsidence is occurring at a rate of 6 to 17 millimeters per year or 2 to 5.5 feet per century. In New Orleans itself, subsidence is approximately 3 feet per century, whereas it is as much as 10 feet per century in Venice (IPET, 2007), which is located approximately 70 miles south of New Orleans. Major natural factors include global sea-level rise, regional subsidence from sedimentary loading of the Gulf of Mexico Basin, and local subsidence due to compaction and consolidation of the Holocene deltaic sediments (IPET, 2007). Human-induced factors include construction of levees, the building of flood control and diversion structures, dredging of navigation and petroleum canals, and the dewatering and pumping of low-lying coastal plain areas to support agricultural and urban development.

5.16 Subsidence is evident within the project area. In the levee-protected project area, lowering of ground-water levels by construction of drainage canals and pumping of interior surface drainage has caused a corresponding net reduction in soil volume, oxidation of the dewatered organic sediments, and an overall decline in surface elevation.

SOCIOECONOMICS

5.17 The focus of the Socioeconomic section is to describe, in general terms, the existing social and economic conditions within the proposed project area and any possible impacts associated with potential weaknesses or failures in the existing levee systems. The main objective is to identify a base of existing socioeconomic parameters to compare against "with-project" impacts (i.e., those affected by the proposed alternatives in relation to flood risk reduction, hurricane protection, and evacuation improvements along LA-23).

5.18 Although considered part of the New Orleans-Metairie-Kenner Metropolitan Statistical Area (MSA), this relatively narrow strip of protected land is largely rural. Its most significant economic activities are associated with its agricultural and industrial land uses. As previously mentioned, major commercial operations are conducted through waterborne commerce along the Mississippi River and Port of Plaquemines, as well as LA-23, all of which provide thoroughfares for industries producing, refining, and transporting important natural resources and related activities in the region, such as crude petroleum, natural gas, and coal. It also provides supporting infrastructure for industries, commercial fisheries, other public/business operations, and the human population.

5.19 An almost direct correlation exists between the number of persons living in an area and the economic opportunities available in that area, especially economic and industrial activity. Therefore, economic and industrial activity is used as an indicator of labor requirements and local demands for community facilities and public services.

5.20 The following paragraphs provide descriptions of the socioeconomic existing conditions in the NFL project area. Where detailed socioeconomic data are available and appropriate, information has been provided as it relates to the existing levee alignments and in each of the five project reaches (referred to as Sections 1 through 5).

Population and Housing

5.21 The latest detailed statistics of population and housing (i.e., by census tract) within the five levee sections of the project area were conducted by the U.S. Census Bureau in 2000. These statistics estimated the total population for all reaches to be more than 2,500 people and the number of total housing units to be more than 900 housing units (including vacant units and camps).

5.22 More recently, however, due to the aftermath of Hurricanes Katrina and Rita that passed through the region in 2005, the total population in the project area decreased to nearly 2,200 people with approximately 800 housing units. In 2000, the population of the five reaches

in the study area accounted for approximately 9.3 percent of the Plaquemines Parish total while housing units represented approximately 8.6 percent. A preliminary review of the housing units within the existing back levees of the project area indicates the vast majority of the units are located in Levee Section 1. This is also evidenced on the land use map on Figure 3-1 in Section 3 of the EIS.

5.23 Most of the residential development in Sections 2 through 5 is located between LA-23 and the Mississippi River. Note that the totals of potential project sections were only part of the population and housing in census tract 504. The total population of the census tract in 2000 was 3,428, and the number of housing units was 1,492. Of the total housing units in the census tract, 360 were vacant, including 269 units used as second homes, camps, or for other occasional use purposes. Many of these are located along docking facilities for recreational or commercial boats beyond existing back levees, but survived the effects of the recent hurricanes. Two of the docking facilities immediately adjacent to the existing back levee are located along Wilkinson Canal at Myrtle Grove and along Lake Hermitage Road which provide access to Hermitage Bayou and Lake Judge Perez.

5.24 In a Corps study conducted following the hurricanes, approximately 16,000 residents were estimated to live south of Belle Chase in 2000. This included 2,100 people on the east bank of the Mississippi River and 13,900 on the west bank. The total number declined to 8,000 in 2006, then increased to 11,600 in 2007. According to Census Bureau estimates, the population of Plaquemines Parish increased from 26,757 to 28,903 from April 2000 to July 2005, respectively, before decreasing to 22,512 in July 2006. This reflects the detrimental effects of Hurricanes Katrina and Rita on the residents and communities located in the NFL project area.

5.25 Table 5-1 compares the 2000 population and housing of each of the reaches (Sections 1 through 5) in the project area by their location east and west of LA-23 from Oakville to St. Jude. As shown, most of the residential development was located in Section 1 in 2000 prior to the recent hurricanes. More than 87 percent of the population and more than 83 percent of the housing units in the project area both east and west of LA-23 were located in Section 1. In addition, a recent study conducted by Louisiana Speaks (i.e., an organizational planning partnership of the State's Louisiana Recovery Authority, Federal agency technical staffs, local and regional planning groups, and citizens) indicated that Reach 1 includes an estimated 1,110 acres of residential land while most of the residential development in Reaches 2 through 5 was rural or small communities between LA-23 and the Mississippi River levee (MRL) system.

TABLE 5-1
2000 POPULATION AND HOUSING, SECTIONS 1 THROUGH 5 OF CENSUS TRACT 504,
PLAQUEMINES PARISH

East of LA-23				West of LA-23				Total	
Census Block		Population (No.)	HUs a/ (No.)	Census Block		Population (No.)	HUs a/ (No.)	Population (No.)	HUs a/ (No.)
SECTION 1									
No. 2001	Group 2	63	23	No. 2003	Group 2	123	41	--	--
No. 2002	Group 2	1	1	No. 2004	Group 2	91	29	--	--
No. 2005	Group 2	40	14	No. 2010	Group 2	48	19	--	--
No. 2006	Group 2	27	12	No. 2016	Group 2	409	128	--	--
No. 2008	Group 2	47	20	No. 2018	Group 2	111	44	--	--
No. 2009	Group 2	223	86	No. 2020	Group 2	399	131	--	--
No. 2013	Group 2	98	35	No. 2034	Group 2	54	12	--	--
No. 2015	Group 2	137	48	No. 2038	Group 2	85	29	--	--
No. 2027	Group 2	21	8	No. 2041	Group 2	89	33	--	--
No. 2029	Group 2	43	14	No. 2042	Group 2	32	13	--	--
No. 2030	Group 2	19	6	N/A	N/A	0	0	--	--
No. 2033	Group 2	55	17	N/A	N/A	0	0	--	--
No. 2035	Group 2	6	4	N/A	N/A	0	0	--	--
No. 2036	Group 2	6	2	N/A	N/A	0	0	--	--
No. 2039	Group 2	3	2	N/A	N/A	0	0	--	--
No. 2040	Group 2	16	5	N/A	N/A	0	0	--	--
TOTAL		805	297	TOTAL		1,441	479	2,246	776
SECTION 2									
No. 1005	Group 1 (20%)	2	3	No. 1008	Group 1	19	7	--	--
No. 1032	Group 1	7	2	No. 1040	Group 1	5	1	--	--
No. 1034	Group 1	45	15	N/A	N/A	0	0	--	--
No. 1071	Group 1	54	17	N/A	N/A	0	0	--	--
No. 1072	Group 1	40	14	N/A	N/A	0	0	--	--
1073	Group 1	39	13	N/A	N/A	0	0	--	--
TOTAL		187	64	TOTAL		24	8	211	72
SECTION 3									
No. 1005	Group 1 (40%)	5	6	No. 1078	Group 1	2	7	--	--
TOTAL		5	6	TOTAL		2	7	7	13
SECTION 4									
No. 1005	Group 1 (40%)	4	6	No. 1092	Group 1	3	30	--	--
No. 1108	Group 1	23	7	No. 1107	Group 1	2	2	--	--
No. 1109	Group 1	68	31	N/A	N/A			--	--
TOTAL		95	44	TOTAL		5	32	100	76
SECTION 5									
No. 1001	Group 1	0	1	N/A		0	0	--	--
No. 1009	Group 1	0	1	N/A		0	0	--	--
No. 1115	Group 1	6	1	N/A		0	0	--	--
TOTAL		6	3	TOTAL		0	0	6	3
TOTAL AREA		1,098	414	TOTAL AREA		1,472	526	2,570	940

SOURCE: U.S. Census Bureau, American FactFinder, File 1, 2000 report. Percentages based on USACE, New Orleans District, estimates 2000 census data.

N/A - Not applicable since units are vacant or beyond census block boundaries.

a/ HUs = Housing Units

Economic Activity

5.26 **Business and Industry Facilities**. Businesses, industries, and agricultural developments located within the project area generate employment through port facilities along the Mississippi River (see the Port of Plaquemines), an oil refinery (Conoco-Phillips), a grain elevator, coal deliveries, pasture and livestock production, and scattered citrus groves south of the oil refinery. The Union Pacific Railroad operates a freight line that parallels LA-23 to a point near the oil refinery and connected with trucking lines. Several small marinas are immediately adjacent to the existing back levees used by commercial fishermen. Expansion of economic development has been limited in part due to the narrow strip of protected land available and periodically threatened by hurricanes. Repopulation activity following Hurricanes Katrina and Rita may still be in transition influencing businesses and industry that were operational prior to Katrina. This potentially includes both new and a renewal of the economic development of port activities and commercial and recreational fisheries; the production, processing, and transport of oil and gas resources; and the availability of water.

5.27 **Manufacturing Refineries**. Recent studies indicate that of the 132 refineries in the Nation, the Conoco-Phillips Alliance refinery ranks as the 18th largest. The Conoco-Phillips refinery, located in Alliance (Section 2 of the project area), carries a processing capacity of approximately 250,000 barrels a day, accounting for approximately 1.5 percent of the total U.S. refining capacity. Its major products are gasoline, diesel fuel, jet fuel, and home heating oil. Much of the output from this plant is delivered to the eastern seaboard states via pipeline. Due to Hurricanes Katrina and Rita damage, it is estimated that the Alliance refinery lost approximately 58 percent of its annual production. An estimate of the value of Alliance's annual output based upon its capacity and using a typical barrel yield of refined product, without taxes, is approximately $8.5 billion in 2006 prices. According to the Louisiana Manufacturers Register in 2006, total employment at this refinery alone was approximately 370, accounting for over 30 percent of the parish employment.

5.28 **A "Millennium" Port**. Developers have expressed an interest in the construction of a "millennium" port on a portion of the west bank of the Mississippi River in the vicinity of the Oakville-St. Jude area. Plans for this development are expected to include major port facilities and services accommodating waterborne vessels, inclusive of docking, loading, unloading, etc. Details are still in the planning stages, and a construction schedule is not currently available. However, should this major development take place, it would further boost economic activity in the project area with significant increases in commercial and industrial enterprises, as well as income and employment.

Income and Employment

5.29 Tables 5-2, 5-3, and 5-4 summarize selected economic activity in the region associated with income and employment based on Bureau of Census and Department of Labor statistics reported for the year 2000. The latest detailed Census data (i.e., by census tract) available were collected to provide representation of the activity in the NFL project area. Although it is reported for 2000, it is a 1999 estimate.

TABLE 5-2
INCOME AND POVERTY STATISTICS, 2000 CENSUS

Item	Census Tract 504		Plaquemines Parish		New Orleans MSA a/	
	(No. or $)	(%)	(No. or $)	(%)	(No. or $)	(%)
HOUSEHOLDS BY INCOME LEVELS (No.)						
Households (No.)	1,139	100.0	9,001	100.0	505,778	100.0
Less than $10,000 (No.)	187	16.4	1,241	13.8	71,481	14.1
$10,000 to $14,999 (No.)	115	10.1	677	7.5	39,225	7.8
$15,000 to $24,999 (No.)	141	12.4	1,137	12.6	72,072	14.2
$25,000 to $34,999 (No.)	107	9.4	1,100	12.2	68,027	13.4
$35,000 to $49,999 (No.)	189	16.6	1,671	18.6	79,686	15.8
$50,000 to $74,999 (No.)	176	15.5	1,584	17.6	85,864	17.0
$75,000 to $99,999 (No.)	98	8.6	902	10.0	42,555	8.4
$100,000 to $149,999 (No.)	72	6.3	479	5.3	29,278	5.8
$150,000 to $199,999 (No.)	9	0.8	76	0.8	7,783	1.5
$200,000 or more (No.)	45	4.0	134	1.5	9,807	1.9
INCOME IN (current 1999 dollars)						
Per Capita Income ($) b/	-	-	15,937	-	17,258	-
Median household income ($)	36,354	-	38,173	-	35,317	-
Families (No.)	911	100.0	6,986	100.0	343,201	100.0
Less than $10,000 (No.)	128	14.1	752	10.8	33,967	9.9
$10,000 to $14,999 (No.)	64	7.0	398	5.7	20,900	6.1
$15,000 to $24,999 (No.)	114	12.5	780	11.2	42,511	12.4
$25,000 to $34,999 (No.)	91	10.0	833	11.9	43,316	12.6
$35,000 to $49,999 (No.)	153	16.8	1,344	19.2	57,330	16.7
$50,000 to $74,999 (No.)	172	18.9	1,447	20.7	68,615	20.0
$75,000 to $99,999 (No.)	88	9.7	839	12.0	36,032	10.5
$100,000 to $149,999 (No.)	58	6.4	414	5.9	25,367	7.4
$150,000 to $199,999 (No.)	9	1.0	69	1.0	6,678	1.9
$200,000 or more (No.)	34	3.7	110	1.6	8,485	2.5
Median family income ($)	40,375	-	42,610	-	42,626	-
POVERTY STATUS (No. Below Poverty Level)						
Families (No.)	187	20.5	1,078	15.4	50,900	14.8
Individuals (No.)	835	24.4	4,682	18.0	241,075	18.4

SOURCE: U.S. Census Bureau, AmericanFactFinder, 2000.

a/ New Orleans MSA includes Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany Parishes.

b/ PCI for State of Louisiana in 1999 was $16,912.

TABLE 5-3
OAKVILLE TO ST. JUDE, HURRICANE PROTECTION SYSTEM
CIVILIAN LABOR FORCE AND EMPLOYMENT STATISTICS, 2000 (CENSUS)

Item	Census Tract 504		Plaquemines		New Orleans MSA a/	
	(No.)	(%)	(No.)	(%)	(No.)	(%)
CIVILIAN LABOR FORCE (CLF)						
Total CLF	1,391	55.8	10,679	54.0	620,909	60.8
Total Employment	1,294	51.9	9,960	50.3	578,676	56.6
Total Unemployment	97	3.9	719	3.6	42,233	4.1
Unemployment Rate (% of CLF)	7.0	-	6.7	-	6.8	-
EMPLOYMENT BY OCCUPATION						
Management, professional, and related	331	25.6	2,463	24.7	190,160	32.9
Service	237	18.3	1,329	13.3	100,068	17.3
Sales and office	269	20.8	2,477	24.9	161,753	28.0
Farming, fishing, and forestry	23	1.8	454	4.6	2,520	0.4
Construction, extraction, and maintenance	174	13.4	1,358	13.6	57,683	10.0
Production, transportation, and material moving	260	20.1	1,879	18.9	66,492	11.5
EMPLOYMENT BY INDUSTRY						
Agriculture, forestry, fishing and hunting, and mining	116	9.0	1,211	12.2	10,859	1.9
Construction	109	8.4	715	7.2	41,870	7.2
Manufacturing	150	11.6	899	9.0	47,125	8.1
Wholesale trade	64	4.9	368	3.7	21,926	3.8
Retail trade	135	10.4	1,051	10.6	66,004	11.4
Transportation and warehousing and utilities	90	7.0	869	8.7	34,726	6.0
Information	0	0.0	59	0.6	12,447	2.2
Finance, insurance, real estate, and rental and leasing	35	2.7	409	4.1	36,115	6.2
Professional, scientific, management, administrative, and waste management services	61	4.7	809	8.1	55,981	9.7
Educational, health and social services	241	18.6	1,508	15.1	123,274	21.3
Arts, entertainment, recreation, accommodation and food services	123	9.5	812	8.2	65,394	11.3
Other services (except public administration)	52	4.0	460	4.6	30,205	5.2
Public administration	118	9.1	790	7.9	32,750	5.7

SOURCE: U.S. Census Bureau, AmericanFactFinder, 2000.

a/ New Orleans MSA, Metropolitan Statistical Area includes Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John the Baptist, and St. Tammany Parishes.

TABLE 5-4
OAKVILLE TO ST. JUDE, HURRICANE PROTECTION SYSTEM
2008 EMPLOYMENT BY INDUSTRY
PLAQUEMINES PARISH

Item	Total Units (No.)	Average Employment (No.)	First Quarter Total Wages ($) a/	Average Weekly Wage ($) a/
EMPLOYMENT BY INDUSTRY				
TOTAL EMPLOYMENT	797	14,026	196,808,738	1,079
Agriculture, forestry, fishing, and hunting	12	48	267,757	429
Mining	49	1,426	33,252,498	1,794
Utilities	3	b/	b/	b/
Construction	92	1,395	19,056,545	1,051
Manufacturing	58	2,110	41,091,892	1,498
Wholesale trade	80	930	11,296,574	934
Retail trade	62	621	3,192,821	395
Transportation and warehousing	102	1,864	29,076,282	1,200
Information	3	11	175,526	1,227
Finance and insurance	21	102	917,919	692
Real estate and rental and leasing	52	540	6,538,450	931
Professional and technical services	60	467	7,596,685	1,251
Management of companies and enterprises	3	177	3,210,600	1,395
Administrative and waste services	42	440	5,729,332	1,002
Educational services	6	936	9,209,231	757
Health care and social assistance	36	529	4,077,295	593
Arts, entertainment, and recreation	9	72	283,301	303
Accommodation and food services	40	647	4,829,299	574
Other services, except public administration	41	179	1,678,168	721
Public administration	20	1,415	14,327,227	779

SOURCE: State of Louisiana, Department of Labor
a/ Values in current year dollars.
b/ Data nonpublishable.

5.30 **Income**. Income and poverty statistics are displayed in Table 5-2 for individuals, households, and families (in current 1999 dollars) for census tract 504, Plaquemines Parish, and for comparison purposes, the larger New Orleans MSA in 2000. Census tract 504 was used to represent the NFL project area. According to these statistics, per capita income (PCI) was estimated to be $15,937 for Plaquemines Parish as compared to PCIs of $17,258 and $16,912 for the New Orleans MSA and State of Louisiana, respectively, for the year 2000. The PCI for census tract 504 was not available. In the comparison of household and family incomes, census tract 504 values parallel the parish and MSA. There were 1,139 households (i.e., occupied housing units) estimated in census tract 504 with a median household income of $36,354 and a median family income of $40,375 in 2000. This compares to a median household income of $38,173 and $35,317 for Plaquemines Parish and the MSA, respectively, and a median family income of $42,610 and $42,626 for Plaquemines Parish and the MSA, respectively, for the same year.

5.31 **Poverty**. Poverty statistics for census tract 504, Plaquemines Parish, and the New Orleans MSA are also presented in Table 5-2 for the year 2000. Based on the available statistics for census tract 504, there were 835 individuals and 187 families estimated to be below poverty level, comprising nearly 24 and 21 percent, respectively, of their totals. Statistics for Plaquemines Parish indicated 18 percent of its individuals were below poverty level versus 15 percent of its families. Results for the New Orleans MSA were the same as Plaquemines Parish.

5.32 **Employment**. Employment statistics, which are displayed in Table 5-3, show the civilian labor force, total employment and unemployment numbers, employment by occupation, and employment by industry for census tract 504, Plaquemines Parish, and, for comparison purposes, the larger New Orleans MSA in 2000. Census tract 504 was used to represent the NFL project area. According to these statistics, total employment for census tract 504 was estimated at 1,294 in 2000 with an unemployment rate of 7 percent, which paralleled both the parish and MSA unemployment estimates for the same year. The employment estimates for the year 2000 are resident-based (i.e., employment of people living in the census tract, parish, or MSA).

5.33 **2000 Employment by Industry**. In a comparison of employment by industry, three sectors comprised the majority of census tract 504 employment in the year 2000. These included educational, health, and social services with 18.6 percent; manufacturing with 11.6 percent; and retail trade with 10.4 percent. This compares to Plaquemines Parish for the same year, with15.1 percent in educational, health, and social services; 12.2 percent in agriculture, forestry, fishing, hunting, and mining; and 10.6 percent in retail trade.

5.34 **2008 Employment by Industry**. Employment statistics, available for the year 2008 for Plaquemines Parish, are presented in Table 5-4. These summarize employment categories in the parish as of the first quarter of 2008 as reported by the Louisiana Department of Labor and Jobs subject to the Louisiana Employment Security Act. The data in this table are employment-based (i.e., jobs in the parish without respect to residential location).

Availability of Public Facilities and Services

5.35 The relatively low population density of the project area tends to limit the demand for certain public facilities such as public schools and hospitals, or services such as police and fire protection. Other services include water and sewerage treatment services; telecommunication operations; and power supplies for industrial, commercial, and residential purposes. In the past, local and state authorities and private developers have provided protection to the back levees of the area against floods and hurricanes. Since Hurricanes Katrina and Rita, more Federal assistance has been authorized for protection against such storm damages.

5.36 Two public facilities that are located immediately within the project area include the Louisiana State University AgCenter Coastal Area Research Station near Point Celeste (Section 4) and the Plaquemines Parish Sheriff's Office Shooting Range in the Myrtle Grove area (Section 3). Other important public facilities providing services immediately adjacent to the project area are the MRL system extending from Cape Girardeau, Missouri, to the Head of Passes in Plaquemines Parish and the Mississippi River Waterway, extending from Minneapolis, Minnesota, to the mouth of the river, including more than a 230-mile deep-draft channel from the Port of Baton Rouge to Head of Passes.

5.37 The planning organization "Louisiana Speaks," which was developed after Hurricanes Katrina and Rita, estimated the cost of damages to the levees in Plaquemines Parish to be approximately $158 million and damages to the pump stations were $17.5 million. Further south of the project area, damages to the flood gates located at Empire and Triumph were estimated to total $20 million. While most of these damages were direct impacts beyond the immediate transportation facilities in the project area, indirect impacts resulting from the destruction of the back levee previously maintained by non-Federal interests were also significant.

Transportation

5.38 Transportation within the project area includes the deep-draft channel of the Mississippi River previously mentioned and ferry service between Pointe a la Hache (on the east bank) to West Pointe a la Hache (on the west bank), as well as several canals located along the project back levees leading to canals, lakes, and bays approaching the Gulf of Mexico. Many canals have been created for the exploration, production, and transport of oil and gas resources important for regional, national, and international economic development. Surrounding waterways have also been used in the commercial and recreational harvest of fish and shellfish. The west bank of the Mississippi River parallels LA-23 which connects New Orleans to the NFL project area communities and the communities of Port Sulphur, Empire, Buras, and the Venice south of the project area. Additionally, the highway is critically important in the transport of residents for hurricane evacuation, as well as the transport of goods and services. The Union-Pacific Rail company, which operates a short spur as far south as the Conoco-Philips refinery, also provides important rail access to area industries.

Community and Regional Growth

5.39 The construction of the proposed project is desirable for community and regional growth. The project will reduce the risk of damage to hurricane storm surge, which will protect communities and local businesses. The proposed hurricane protection project is considered progress that responds to the needs of the local communities and region, and is consistent with National Economic Development guidelines.

Property Values and Tax Revenues

5.40 Property values and tax revenues within the project area and much of Plaquemines Parish have somewhat unique characteristics. The parish has the limited availability of protected land along one of the world's most important waterways with large quantities of oil and gas nearby, as well as large quantities of commercial fisheries, contributing to property values. On the other hand, the area is susceptible to severe weather conditions and high river stages, threatening property damages and limiting the tax base required for urban expansion. Such factors as increasing subsidence rates over the past century can influence property values and subsequently tax revenues.

Community Cohesion

5.41 Community cohesion may be considered as the unifying force of a group due to one or more characteristics that provide commonality. These characteristics may include such commonality as race, education, income, ethnicity, religion, language, and mutual economic and social benefits. Community cohesion may be the force that keeps groups together long enough to establish meaningful interactions, common institutions, and agreed ways of behavior. It is a dynamic process, changing as the physical and human environment changes. For example, changing a right-of-way may divide a community, it may cause the dislocation of a significant number of residents, or it may require the relocation of an important local institution such as a church or community center. On the other hand, a Civil Works project for flood and hurricane protection may create common bonds and enhance community cohesion.

BIOLOGICAL RESOURCES

Introduction

5.42 The Plaquemines Parish west bank NFL project area lies within the ecosystem identified by the U.S. Fish and Wildlife Service (FWS) as the Lower Mississippi River Ecosystem. The Louisiana Department of Wildlife and Fisheries (LDWF) places the project area within two of the state's ecoregions--Mississippi River Alluvial Plain (primarily) and Gulf Coast Prairies and Marshes. The Mississippi River delta and adjacent estuaries serve as the primary wintering habitat for midcontinent waterfowl populations, as well as breeding and migration habitat for migratory songbirds returning from Central and South America. They also provide habitat for numerous resident fish and wildlife species.

Habitats

5.43 The majority of the habitat within the area between the non-Federal back levee and the MR&T levee along the Mississippi River's west bank is culturally influenced, significantly disturbed, and considered of low quality. Much of this land is currently used as pasture or citrus cultivation, whereas other areas are residential and industrial. Yet within the project area, there are some relatively undisturbed natural habitats. Most of these natural habitats are aquatic, whereas a small proportion is terrestrial or nonaquatic.

Aquatic Habitats

5.44 Aquatic habitats within the project area represent three major systems--estuarine, palustrine, and riverine (LDWF, 2004). Estuarine habitats are found on the flood side of the west bank NFL; these occur in brackish water, are subject to tidal influence, and are associated with the Barataria estuary. Palustrine habitats are vegetated and supplied by freshwater. Most are found within the levee-protected area, although some occur along the flood side of the NFL. Riverine habitats are also freshwater habitats; within the project area this type of habitat is unvegetated, subject to tidal influence, and is represented by the Mississippi River.

Wetlands

5.45 Most of the aquatic habitats that are present within the project area are wetlands. Wetlands are semiaquatic lands and flooded or saturated by water for varying periods of time. For an area to be delineated as a wetland, it must exhibit appropriate hydrology, contain hydric soils, and support hydrophytic vegetation (USACE, 1987). Palustrine habitats consist of freshwater wetlands that support natural vegetation that is either primarily woody or herbaceous. Palustrine wetlands dominated by woody vegetation include wet bottom-land hardwoods, cypress-tupelo swamp, wet subsiding ridge, wet scrub-shrub, and batture forest. Wet pasture and freshwater marsh are palustrine wetlands dominated by herbaceous or nonwoody vegetation. Among estuarine habitats, intermediate marsh, brackish marsh, and submerged aquatic vegetation (SAV)/open water habitat are found within the project area. Saline marsh is not present.

5.46 Figures 5-1 through 5-4 show the natural habitats, including wetlands, within the project area. Habitats that occur within the levee-protected area (as far east as LA-23) are quantified in Table 5-5. Because estuarine habitats are found on the flood side of the NFL, they are not reflected in Table 5-5.

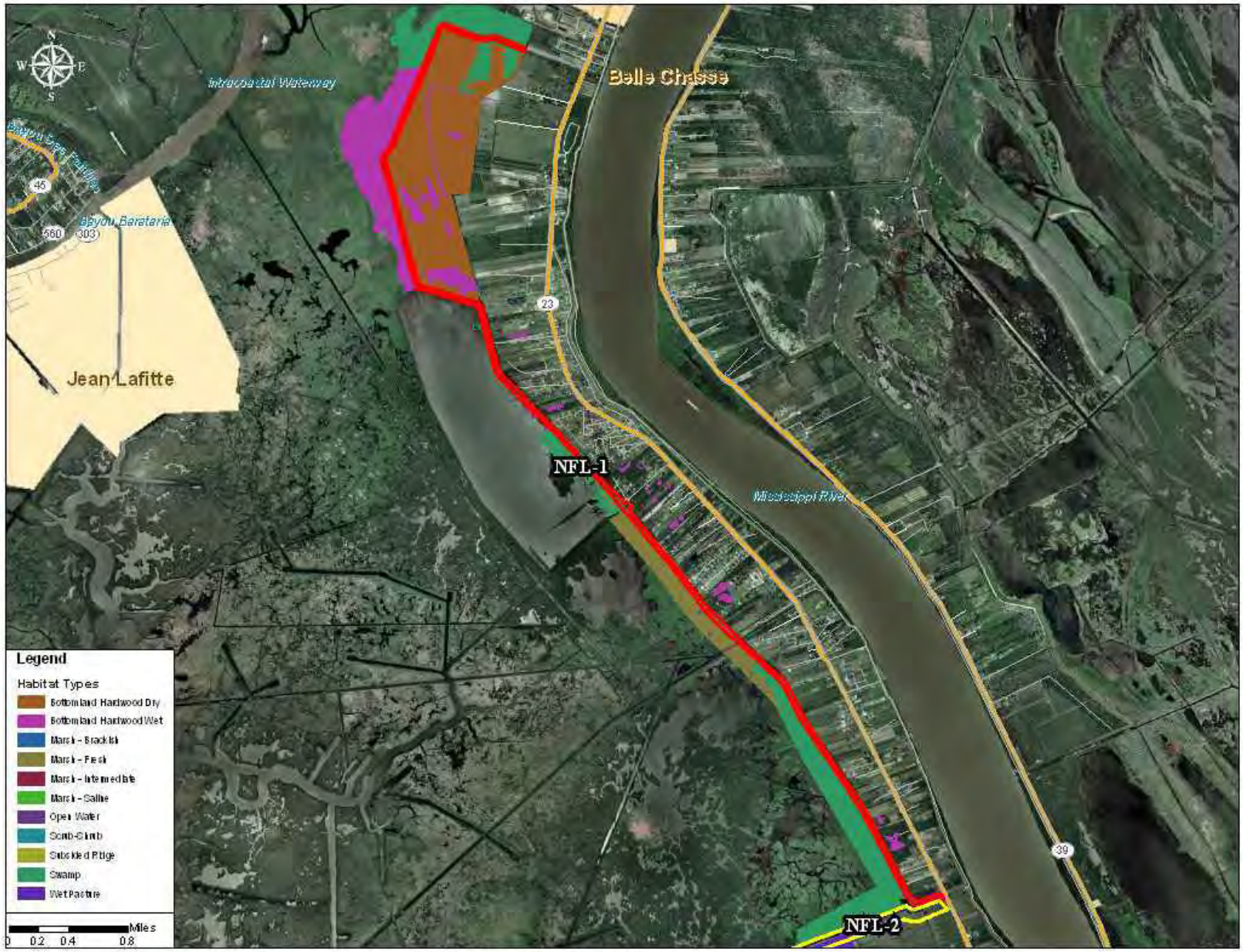

Figure 5-1. Natural Habitats of Section 1, Oakville to La Reussite.

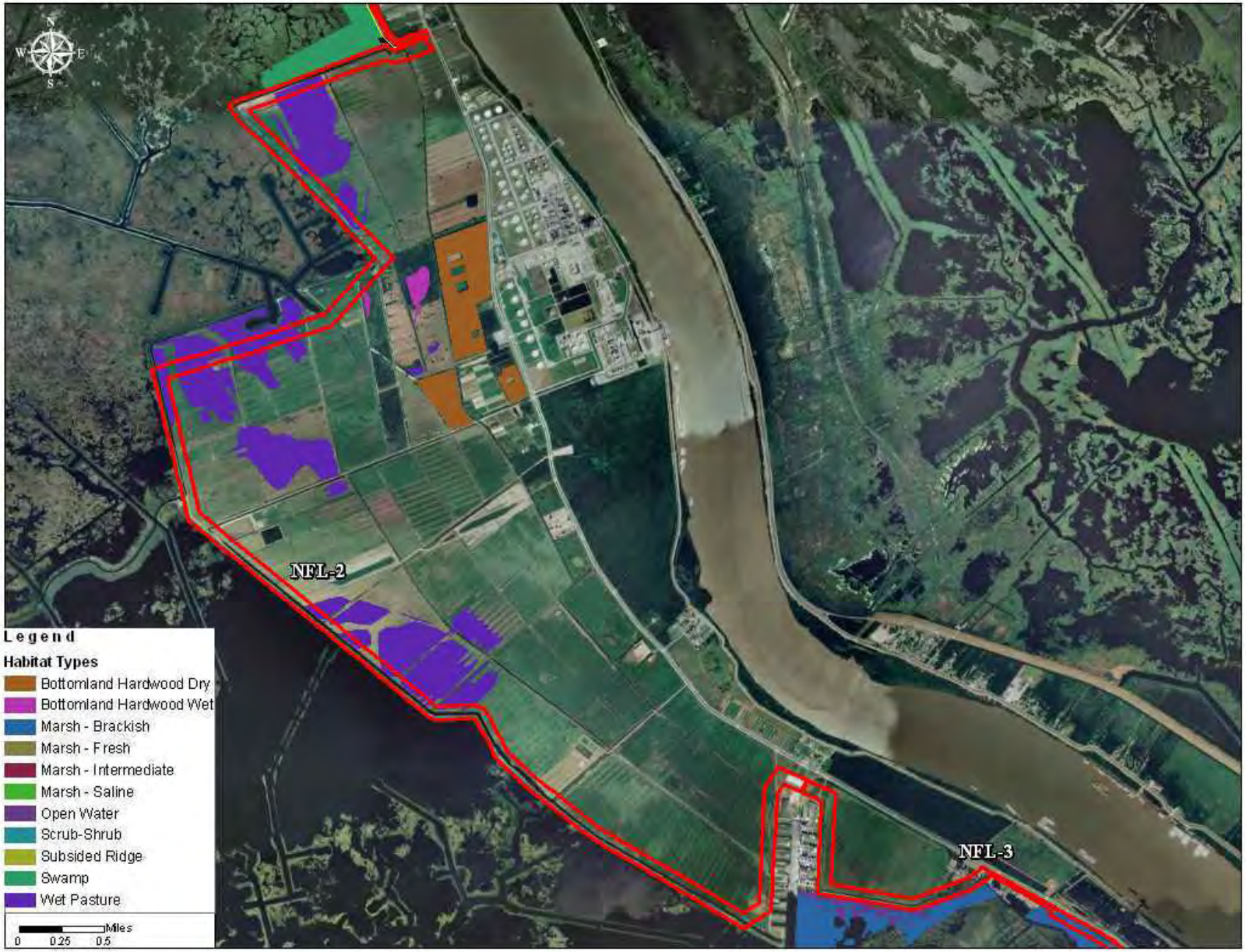

Figure 5-2. Natural Habitats of Sections 2 and 3, La Reussite to Myrtle Grove.

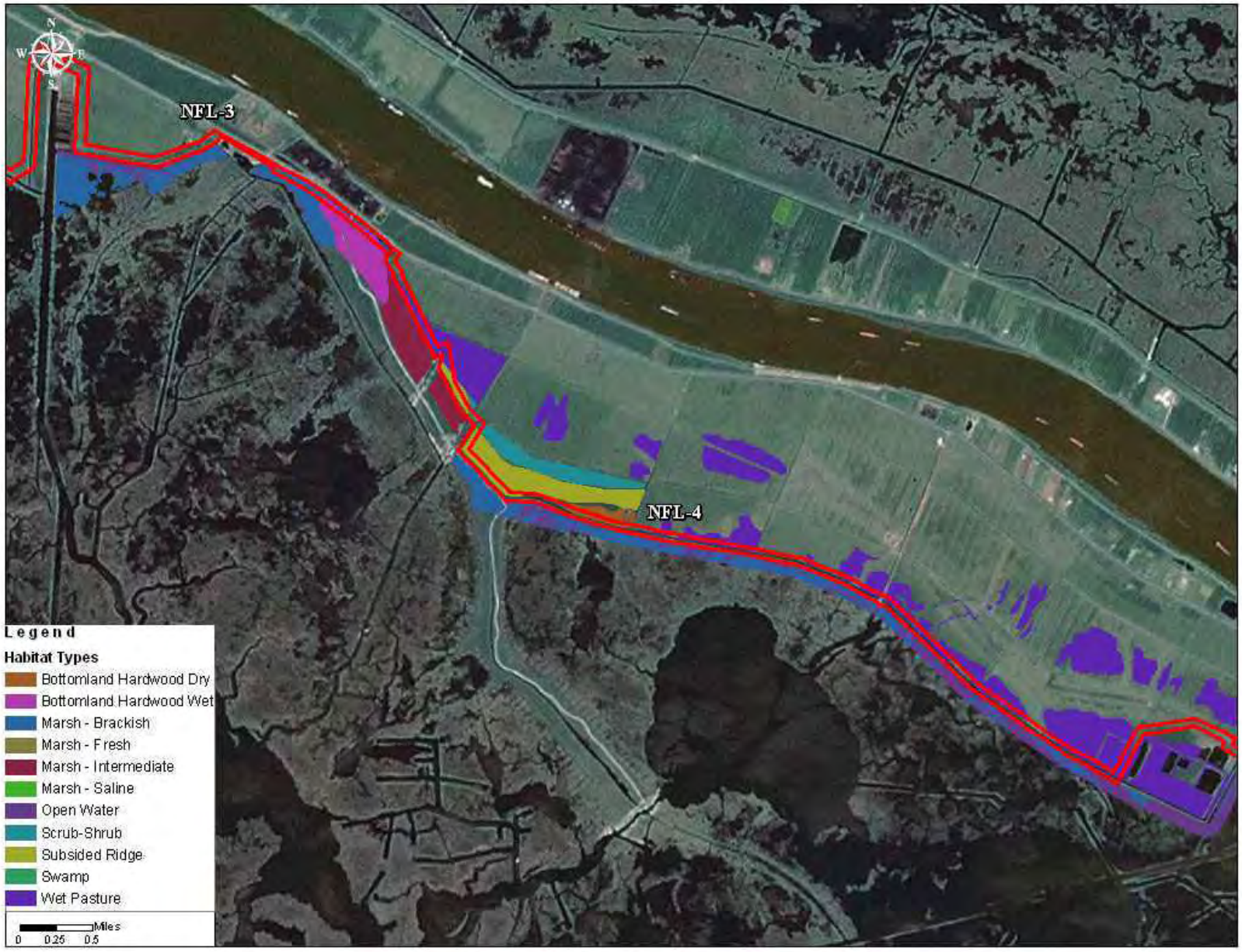

Figure 5-3. Natural Habitats of Sections 3 and 4, Myrtle Grove to Point Celeste.

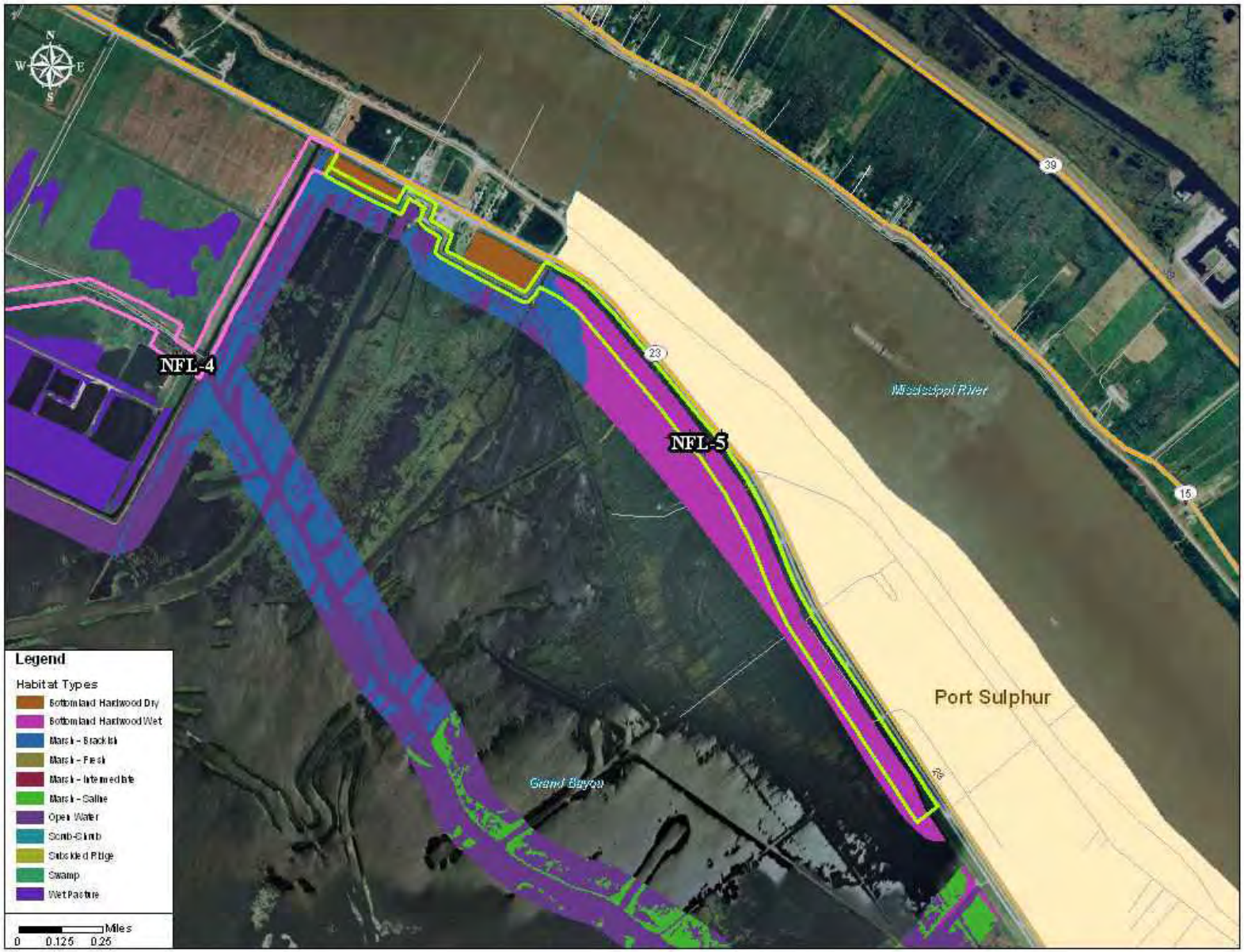

Figure 5-4. Natural Habitats of Section 5, Point Celeste to St. Jude.

TABLE 5-5
NATURAL HABITATS (ACRES) ENCLOSED BY EXISTING NFL

Habitat Type	Bottom-land Hardwoods Wet	Bottom-land Hardwoods Dry	Wet Pasture	Swamp	Scrub Shrub
Acres	213.8	672.1	1,212.1	34.9	76.9

5.47 Wetlands restore and maintain water quality by removing and retaining nutrients contained in stormwater runoff that would otherwise flow directly into the water column. These ecosystems provide critical habitat for a diversity of plants and animals, including fish, shellfish, waterfowl, shore birds, wading birds, songbirds, and mammals. Wetlands provide reduced flooding by retaining water that would otherwise flood nearby residential and agricultural areas. Wetlands also act as storm buffers from highly erosive wave action to surrounding areas in the Louisiana coastal zone. Furthermore, wetlands provide many recreational and economic benefits to Louisiana and the entire Nation. Much of the use of this resource is governed by the Clean Water Act of 1977, as amended; Executive Order 11990 of 1977, Protection of Wetlands; the Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968.

5.48 The loss of wetlands has been an issue of major concern in coastal Louisiana, including the Barataria estuary. Contributing factors responsible for that wetland loss include subsidence, saltwater intrusion, sea-level rise, canal and levee construction, urban expansion, and navigation and flood risk reduction projects. Although the causes vary, all have resulted in the conversion of wetland habitats to areas of open water. A total of 312 square miles of land in the Barataria Basin has converted to open water since 1956 (Barras, 2006).

5.49 **Wet Bottom-land Hardwoods.**

1. In general, wet bottom-land hardwoods are forested, alluvial, wetlands occupying broad flood plain areas that flank large river systems. Wet bottom-land hardwoods are characterized and maintained by a natural hydrologic regime of alternating wet and dry periods generally following seasonal flooding events. These forests support distinct assemblages of plants and animals associated with particular landforms, hydric soils, and hydrologic regimes. They are important natural communities for maintenance of water quality, providing a very productive habitat for a variety of fish and wildlife species, and are important in regulating flooding and stream recharge.

2. Relatively small areas of wet bottom-land hardwoods are enclosed by the NFL in Sections 1, 2, and 3. In addition, some wet bottom-land hardwood habitat occurs on the flood side of the NFL along portions of Sections 1 and 3. Dominant woody species consist of red maple (*Acer rubrum*), boxelder (*Acer negundo*), green ash (*Fraxinus pennsylvanica*), sweetgum (*Liquidambar styraciflua*), black willow (*Salix nigra*), and hackberry (*Celtis laevigata*), with the occasional American elm (*Ulmus americana*), bald cypress (*Taxodium distichum*), pecan (*Carya illinoinensis*), water oak (*Quercus nigra*), and nuttall oak (*Quercus texana*).

5.50 **Cypress-Tupelo Swamp.**

1. Cypress-tupelo swamps are forested, alluvial habitats on intermittently exposed soils most commonly found along rivers and streams, but also occurring in back swamp depressions and swales. The soils are inundated or saturated by surface water or ground water on a nearly permanent basis throughout the growing season except during periods of extreme drought. Cypress-tupelo swamps have relatively low plant diversity. Undergrowth is often sparse because of low light intensity and long hydroperiods. They are important natural communities for maintenance of water quality, providing a very productive habitat for a variety of fish and wildlife species, and are important in regulating flooding and stream recharge.

2. Cypress-tupelo swamp occurs on the protected side of the NFL in the north end of Section 1 in several relatively small patches. Dominant overstory plant species include bald cypress (*Taxodium distichum*) and a few tupelo gum (*Nyssa aquatica*). Midstory includes red maple (*Acer rubrum*), box elder (*Acer negundo*), hackberry (*Celtis laevigata*), and on the edge black willow (*Salix nigra*). Openings in canopy reveal an understory seed bank of red maple, dwarf palmetto (*Sabal minor*), wax myrtle (*Myrica cerifera*), and Chinese tallow (*Triadica sebiferum*). This type of habitat will eventually convert to bottom-land hardwoods because of protection from river flooding and efforts to drain surface water. Also, areas of forested swamp occur on the flood side of the NFL in the northern and southern portions of Section 1. The dominant vegetation observed within these areas includes bald cypress (*Taxodium distichum*), black willow (*Silax nigra*), button bush (*Cephalanthus occidentalis*), cattail (*Typha sp*.), arrowhead (*Sagittaria sp.*), water hyacinth (*Eichhornia crassipes*), switchgrass (*Panicum virgatum*), common rush (*Juncus effusus*), goldenrod (*Solidago sp*.), and eastern baccharis (*Baccharis halimifolia*).

5.51 **Wet Pasture.** Some of the levee-protected project area that is used as cattle pasture occurs on topographical depressions that are often wet. Areas of wet pasture that are considered by the Corps to be jurisdictional wetlands occur in Sections 2 and 4 in numerous patches. Dominant herbaceous species include Bermuda grass (*Cynodon* sp.) and scattered smartweed (*Polygonum* sp.). Woody vegetation often encroaches into these wet areas to form a scrub-shrub layer of eastern baccharis (*Baccharis halimifolia*) and rattlebox (*Sesbania drummondii*). The low plant species diversity of these wet pasture areas limits their value to wildlife.

5.52 **Freshwater Marsh.** Freshwater marsh occurs on the flood side of the NFL along portions of Sections 1 and 3. Freshwater marsh is a component of the marsh system of coastal Louisiana and is normally located adjacent to estuarine types of coastal marshes of Barataria Bay (described below). Salinities in freshwater marshes are usually less than 2 ppt and normally average approximately 0.5 to 1 ppt. Freshwater marsh has the greatest plant diversity and highest soil organic matter content of any coastal marsh type. It is frequently dominated by maidencane *(Panicum hemitomon)*. Other characteristic plant species include spikesedge, alligatorweed, marshhay cordgrass, roseau cane, coontail (*Ceratophyllum demursum*), water hyacinth (*Eichhornia crassipes)*, pickerelweed (*Pontederia cordata*), pennyworts (*Hydrocotyle* spp.), common duckweed (*Lemna minor),* and cattails *(Typha* spp.). This marsh type is very important to many species of birdlife and supports large numbers of wintering waterfowl. It is also critical nursery habitat for larval marine organisms.

5.53 **Intermediate Marsh.** Intermediate marsh is found within the project area on the flood side of the NFL along portions of Section 3. Intermediate marsh is oligohaline (salinity of 3 to 10 ppt) and is dominated by narrow-leaved, persistent plant species. This marsh is characterized by a diversity of species, many of which are found in freshwater marsh and some of which are found in brackish marsh. It is often dominated by marshhay cordgrass (*Spartina patens*). Other characteristic species include roseau cane *(Phragmites communis*), bulltongue (*Sagittaria lancifolia),* spikesedge (*Eleocharis* sp.), three-cornered grass (*Schoenoplectus olneyi*), and Gulf cordgrass (*S. spartineae).* This marsh type is very important to many species of birdlife and supports large numbers of wintering waterfowl. It is also critical nursery habitat for larval marine organisms.

5.54 **Brackish Marsh.** In the project area, brackish marsh is found on the flood side of the NFL along a portion of Section 3. Brackish marsh has an average salinity of approximately 8 ppt. This community is irregularly tidally flooded and dominated by salt-tolerant grasses. Plant diversity and soil organic matter content are lower in brackish marsh than in intermediate marsh. Brackish marsh is typically dominated by marshhay cordgrass (*Spartina patens*). Other significant associated species include saltgrass (*Distichlis spicata*), three-cornered grass (*Schoenoplectus olneyi),* saltmarsh bulrush *(Scirpus robustus*), dwarf spikerush (*Eleocharis parvula),* black needlerush, and smooth cordgrass. Brackish marsh is of very high value to estuarine larval forms of marine organisms such as shrimp, crabs, menhaden, etc.

5.55 **Batture Forest.** Batture, or riverfront, forest naturally occurs along the banks of the Mississippi River. In the vicinity of the project area, this type of forest occurs in a narrow band along the riverside of the MR&T levee. Along the west bank, batture forest is often lacking in the vicinity of industrial development. Where it is present, its width varies from several trees wide to less than 500 feet. Dominant tree species consist of black willow (*Salix nigra*), sandbar willow (*Salix exigua*), and cottonwood (*Populus deltoides*). This palustrine forest is subject to flooding primarily during the spring and summer months, and river sediments are deposited with each flood. Although this forest generally offers suitable habitat for a variety of species, its narrow width within the project area lowers its value to wildlife.

Terrestrial or Upland Habitats

5.56 Upland resources are those portions of the study area that are not wetland or open water habitat. Upland habitats within the project area consist of three major types--dry bottom-land hardwoods, agricultural lands, and residential and other developed lands.

5.57 **Dry Bottom-land Hardwoods.** Areas of dry bottom-land hardwoods are present within the levee protected area in Sections 1, 2, and 5. In Section 1, this habitat consists of a relatively large tract that envelops areas of wet bottom-land hardwoods. This dry type of forest is a terrestrial habitat because it does not meet the definition of a wetland since it occurs on somewhat higher ground that is better drained. Characteristic plant species include water oak (*Quercus nigra*), live oak (*Quercus virginiana*), roughleaf dogwood (*Cornus drummondii*), hackberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), Chinese tallow tree (*Triadica sebifera*), saw palmetto (*Serenoa repens*), eastern baccharis (*Baccharis halimifolia*), and peppervine (*Ampelopsis arborea*). This habitat is important because of the production of hard mast on relatively high ground which benefits a number of wildlife species.

5.58 **Other Terrestrial Habitats.** Dry pasture, agricultural areas such as citrus groves, and residential and industrial areas with grassy lawns and scattered trees serve as upland habitat for a variety of wildlife species that are typical of agricultural and suburban areas.

Biota

5.59 Various plants and animals that inhabit the project area have been mentioned in the habitat descriptions provided above. The following information describes these species further.

Plants

5.60 There are a number of nonnative invasive plant species in the project area. The most visible is the Chinese tallow tree which has become established in forested swamps and wet scrub-shrub habitats. It can affect plant community structure by becoming the most abundant woody species at many locations. While providing very little wildlife habitat value other than occasional utilization as resting and escape cover, Chinese tallow can limit or eliminate native species that are much more frequently utilized by native wildlife species. It has the potential to invade surrounding marshes and convert them from herbaceous to woody plant communities (Neyland and Meyer, 1997).

5.61 Other kinds of invasive aquatic plant species are likely to be present within the project area, especially on the flood side of the NFL. They include water hyacinth (*Eichhornia crassipes*), parrot feather (*Myriophyllum aquaticum*), hydrilla (*Hydrilla verticillata*), Brazilian waterweed (*Egeria densa*), Eurasian watermilfoil (*Myriophyllum spicatum*), water lettuce (*Pistia stratiotes*), and common salvinia (*Salvinia minima*). These plants are known to occur in the coastal marshes and canals of the Barataria estuary. They have the ability to form dense mats that cover entire bodies of water with a thick layer that blocks sunlight, thereby reducing photosynthesis, reducing dissolved oxygen (DO), and causing fishkills.

Animals

5.62 This resource is institutionally significant because of the Fish and Wildlife Conservation Act of 1980; the Fish and Wildlife Coordination Act of 1958, as amended; the Migratory Bird Conservation Act; the Migratory Bird Treaty Act; the Endangered Species Act of 1973; and Executive Order 13186 Migratory Bird Habitat Protection. Wildlife resources are technically significant because they are a critical element of various habitats and species assemblages, they are often an indicator of the health of those habitats, and many wildlife species are important commercial resources. Wildlife resources are publicly significant because of the high priority the public places on their esthetic, recreational, and commercial value.

5.63 The nutria (*Myocastor coypus)*, a nonnative, invasive aquatic mammal, is found throughout the project area. Originally introduced in the southeastern United States for their fur, nutrias have become a nuisance in the region due to destructive eating and burrowing patterns.

5.64 The diversity of habitats within the vicinity of the project area is home to a wide variety of animals. Wildlife that typically inhabits the wetland forest, wet scrub/shrub, upland forest, fresh marsh, intermediate marsh, brackish marsh, and open water habitats in and around the project area includes a diverse assemblage of amphibians, reptiles, birds, and mammals. Because the majority of the project area is in agriculture or urban land cover, such areas provide relatively little quality habitat compared to the areas that are forested, scrub/shrub, or aquatic habitats.

5.65 There are no Federal or state wildlife refuges or parks within Plaquemines Parish.

5.66 **Terrestrial Animals**.

1. Common mammals within the project area include the Virginia opossum, nine-banded armadillo, coyote, raccoon, white-tailed deer, nutria, muskrat, and swamp rabbit. Game species include squirrel, rabbit, and deer. Trapping for furbearers is a traditional activity that, although allowed, has decreased in activity due to reduced demand for furs. Major furbearing species are raccoon, opossum, mink, bobcat, and nutria.

2. More than one-half of the species of birds in North America are resident in the state or spend a portion of their migration in Louisiana. About 350 species of birds have been recorded from the Barataria-Terrebone estuary system (Condrey, et al, 1996). Of these, migratory wildfowl are abundant and include several species of ducks and geese that spend the winter on the tidal marshes in or near the project site. Wintering ducks and geese arrive in November; common snipe and woodcock also arrive in the fall and spend the winter. Various wading birds and shore birds also inhabit the marshes, and they include the marsh wren, seaside sparrow, red-winged blackbird, Wilson snipe, woodcock, and various species of sandpipers.

3. In addition to migratory waterfowl, the area is important to neotropical migratory birds. Louisiana lies in the center of the flight path of migratory birds crossing the Gulf of Mexico to and from the Yucatan peninsula. An enormous number of migratory songbirds pass

over the Barataria estuary and Mississippi River delta each spring and fall. When birds reach the Louisiana coast, their energy reserves are exhausted. Without coastal woodlands for a resting and feeding area and for protection from predators and weather, some portion of millions of songbirds which nest in the United States and Canada probably would not survive (Lowery, 1955).

4. Alligators are common in the project area. Other reptiles found in the area include numerous species of turtles, lizards, salamanders, snakes, and frogs.

5.67 **Aquatic Animals**. Aquatic organisms in the project area reflect the great diversity of fish and invertebrate resources found in the surrounding coastal waters and the Gulf of Mexico.

1. **Invertebrates**. Shrimp, crab, oyster, clam, and crawfish are estuarine-dependent invertebrates that are ecologically important in the food webs of coastal Louisiana, including the Barataria estuary. These invertebrates, except for oyster, are expected to occur in the coastal habitats occurring on the flood side of the NFL. These animals also support important recreational and commercial fisheries. White and brown shrimp comprise much of Louisiana's seafood industry.

2. **Fisheries**.

a. Many fish of the Gulf of Mexico are estuarine-dependent as they depend on estuaries for reproduction, nursery areas, food production, or migrations. Approximately 75 percent of the commercially important fish and shellfish depend on estuaries at some stage of their life cycle (National Marine Fishery Service (NMFS), 2007). Approximately 35 freshwater, 25 estuarine, 25 estuarine-marine, and 105 marine fish species are known to use the Barataria estuary (Condrey, et al, 1996). Among these, common species include Gulf menhaden (*Brevoortia patronus*), killifish (*Fundulus* spp.), sheepshead minnow (*Cyprinodon variegatus*), mosquito fish (*Gambusia affinis*), striped mullet (*Mugil cephalus*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), hardhead catfish (*Arius felis*), silver perch (*Bairdiella chrysura*), and hogchoker (*Trinectes maculatus*). The major freshwater families occurring in the estuary portion of the project area are *Lepisosteidae* (gars), *Clupeidae* (shad and herring), I*ctaluridae* (catfish), *Cyprinidae* (minnow and carp), and *Centrarchidae* (sunfish, bass, and crappie).

b. Fishing is a major recreational activity in the Barataria estuary. At the upper end of the system, freshwater gamefish include catfish, *centrarchid* (sunfish, bass and crappie), and bowfin (*choupique*). The principal finfish harvested by marine recreational fishermen in 2006 in Louisiana were saltwater catfish, black drum, red drum, spotted seatrout, and southern flounder, all of which are found in the Barataria system (http://www.st.nmfs.gov).

c. Commercial fishing is an important economic resource to the area. The principal finfish harvested are Atlantic croaker, black drum, gafftopsail catfish, red drum, sand seatrout, sheepshead, southern flounder, and spotted seatrout. Other important commercial species include Atlantic menhaden, white shrimp, Atlantic croaker, brown shrimp, striped mullet,

southern flounder, and unclassified bait-fish. From 2005 to 2007, Louisiana ranked second only to Alaska in commercial landings. In 2007, the Louisiana commercial fishery landed 997 million pounds with a value of $287 million (http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html).

d. Fish of the Mississippi River include a variety of freshwater species, as well as some saltwater species. Fish inhabiting the ditches and canals of the drainage system would be freshwater species tolerant of wide fluctuations in turbidity, water temperature, and DO, such as carp, bullhead, and some catfish. Recreational fishing in the local Mississippi River and drainage system is far less common than that which occurs in the Barataria estuary.

3. **Essential Fish Habitat**.

a. The Magnuson-Stevens Fishery Conservation and Management Act, as amended, Public Law 104-208, addresses the authorized responsibilities for the protection of Essential Fish Habitat (EFH) by NMFS in association with regional fishery management councils (FMC). The act establishes eight regional FMCs responsible for the protection of marine fisheries within their respective jurisdictions. The EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This definition extends to habitat specific to an individual species or group of species, whichever is appropriate within each Fishery Management Plan (FMP). The act also authorizes the designation of Habitat Areas of Particular Concern (HAPC) for marine fisheries. These areas are subsets of EFH that are rare, susceptible to human degradation, ecologically important, or located in an ecologically stressed area. Any Federal agency that proposes any action that potentially affects or disturbs any EFH must consult with the Secretary of Commerce and FMC authority per the Magnuson-Stevens Act, as amended (2005). Interim final rules were published on December 19, 1997, in the Federal Register (Vol. 62, No. 244) to establish guidelines for the identification and description of EFH in fishery management plans. These guidelines include impacts from fishing and nonfishing activities, as well as the identification of actions needed to conserve and enhance EFH. The rule was established to provide protection, conservation, and enhancement of EFH. The estuarine and marine waters of Plaquemines Parish are included in the EFH-managed area. Categories of EFH that are designated within the proposed project area include estuarine wetlands (intertidal vegetation), estuarine water column, substrates (mud, sand, shell, rock, and associated biological communities), a limited presence of subtidal vegetation (submerged aquatic vegetation (SAV), sea grasses, and algae), shallow open water with nonvegetated bottoms.

b. The proposed NFL project corridor is located in an area identified as EFH for larval, postlarval, juvenile, sub-adult, and adult life stages of brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), red drum (*Sciaenops ocellatus*), Gulf stone crab (*Menippe adina).* Table 5-6 presents the species-specific EFH requirements during the various life stages of the Federally managed fish.

TABLE 5-6
DESIGNATED ESSENTIAL FISH HABITAT FOR
FEDERALLY MANAGED SPECIES THAT OCCUR IN THE
NFL PROJECT AREA

Species	Life Stage	Designated EFH
Brown shrimp *(Penaeus aztecus)*	Eggs/larvae	Nearshore and offshore gulf waters (< 110 m, demersal)
	Postlarval/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 *(Penaeus setiferus)*	Eggs/larvae	Nearshore gulf waters < 40 m from shoreline
	Postlarval/juvenile	Marsh edge and ponds, SAV, inner marsh, oyster reefs
	Sub-adult	Same as post larval/juvenile
	Adult	Nearshore gulf waters to 30 m from shoreline
Red drum *(Sciaenops ocellatus)*	Eggs/larvae	Nearshore and offshore gulf waters
	Postlarval/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 50 m in depth), shell substrate; estuarine and marine mud bottoms
Gulf Stone Crag (Menippe adina)	Eggs	18 m sand shell and soft bottom
	Larvae, Post larval, Juvenile	18 m, oyster reefs, sand, shell, and soft bottoms

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 in 2007 (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).

(1) **Shrimp species**. Shrimp species include the brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), and pink shrimp (*Farfantepenaeus duorarum*). Adult penaeids generally occupy offshore areas of higher salinity where spawning occurs. After hatching, larvae enter estuaries and remain there throughout the juvenile stage. Estuarine habitat serves as a nursery area offering a suitable substrate, an abundant food supply, and protection from predators. Subadult shrimp consume organic matter, including marsh grasses and

microorganisms found in estuarine sediments. Adult shrimp are omnivorous. The EFH includes shallow inshore waters, marsh edge, SAV, tidal creeks, inner marsh, mud bottoms, and sand/shell substrate. The HAPC includes tidal inlets and state nursery and overwintering habitats. These areas contain a high abundance of juvenile specimens and are critical for early growth and development. No designated HAPC for the assemblage occurs within the project area.

(2) **Gulf stone crab**. Gulf stone crabs (*Menippe adina*) occur throughout the Gulf of Mexico, although the majority of fishing occurs along the gulf coast of Florida. Stone crabs are benthic and can be found from the shoreline out to depths of 200 feet. Juveniles can be found on shell bottom, sponges, and *Sargassum* mats, as well as in channels and deep grass flats. Stone crab larvae are planktonic and require warm water 30 degrees Celsius and high salinity (30 to 35 ppt) for most rapid growth. The stone crab is a high trophic predator and primarily carnivorous at all life stages. Juveniles feed on small molluscs, polychaetes, and crustaceans. The EFH for the Gulf stone crab includes inshore waters of less than 59 feet, estuarine hard bottoms, estuarine sand/shell, estuarine SAV, near-shore hard bottoms, and near-shore sand/shell. No designated HAPC for the assemblage occurs within the project area.

(3) **Red drum**. Red drum (*Scianeops ocellatus*) is an important recreational gamefish found in coastal waters throughout the Gulf of Mexico. Adults inhabit near-shore waters, particularly areas within the surf zone or in the vicinity of inlets. Spawning occurs in near-shore areas, and eggs and larvae are transported by tides and wind currents into estuaries. Larvae and juveniles occupy estuarine environments until maturation. Red drum are predatory in all stages of life; however, the type of prey consumed varies with life stage. Subadult red drum primarily consume small marine invertebrates including mysids and copepods, while adult specimens feed on large marine invertebrates, including shrimp and crabs, and small fishes. The EFH for red drum includes tidal inlets, mud bottoms, SAV, the marsh-water interface, mangrove communities, oyster reefs, and near-shore waters with depths of less than 164 feet. The HAPC for red drum includes tidal inlets, state nursery areas, spawning sites, and SAV. No designated HAPC for the assemblage occurs within the project area.

Protected Species

5.68 The Louisiana Natural Heritage Program (LNHP) of LDWF has developed lists and monitors the status of rare, threatened and endangered species, and natural communities for each parish of the state. The information includes state and global rank and state and Federal status for species and state and global rank for rare habitats. The species and habitats listed by the State of Louisiana may be found at http://www.wlf.louisiana.gov/wildlife/species-parish-list.

5.69 Of the six Federally listed species, only one may potentially inhabit or utilize the project vicinity--the pallid sturgeon (*Scaphirynchus albus*) in the Mississippi River. Existing habitat within the project area does not match the habitats of the brown pelican, peregrine falcon, piping plover, or West Indian manatee. According to an e-mail message dated September 29, 2008, from FWS, "there are no threatened or endangered species within the project area." The FWS correspondence can be found in Appendix A. Although the bald eagle is no longer listed, it is included in Table 5-7 because the species is still protected under Federal law; three existing nests are located in close proximity to the project area. No designated critical habitat for any of these listed species occurs in the project vicinity.

TABLE 5-7
FEDERALLY THREATENED (T) AND ENDANGERED (E) SPECIES IN PLAQUEMINES PARISH

Common Name	Scientific name	Federal Status	State Status
American Alligator	*Alligator mississippiensis*	T (S/A)	Not listed
Bald eagle	*Haliaeetus leucocephalus*	Delisted	E
Brown Pelican	*Pelecanus occidentalis*	E	E
Pallid sturgeon	*Scaphirynchus albus*	E	Not listed
Peregrine falcon	*Falco peregrines*	E	T/E
Piping plover	*Charadrius melodus*	T/E	T/E
West Indian Manatee	*Trichechus manatus*	E	E

SOURCE: LDWF, 2008.
NOTE: S/A - Similarity of Appearance.

5.70 **American Alligator**. The American alligator is common in canals. This species is listed as threatened under the S/A clause of the Endangered Species Act (Federal Register 1981, Vol. 46, pp. 40664-40669), but it is not biologically threatened or endangered.

5.71 **Pallid Sturgeon**. The pallid sturgeon is an endangered fish found in Louisiana in both the Mississippi and Atchafalaya Rivers and possibly in the Red River as well. The pallid sturgeon is a relatively large, cylindrical fish with shovel-shaped head and slender tail base. The tail fin is 2-lobed with the top lobe being larger than the bottom lobe which terminates in a long filament. The mouth is placed on the underside of the head and is preceded by several fleshy barbells. Coloring is grayish-white above and white below. Adults typically range between 19.5 and 31.2 inches in length and up to 65 pounds in weight. They can be separated from the similar and more common shovelnose sturgeon (*S. platorhynchus*) by the absence of bony plates on the belly. The pallid sturgeon has adapted to riverine conditions that can be described as large, free-flowing, turbid water with a diverse assemblage of physical habitats that are in a constant state of change. Detailed habitat requirements of this fish are not known, but it is believed to spawn in rivers of Louisiana. Spawning takes place in the spring or early summer. Aquatic insects and small fish comprise a majority of their diet. Habitat loss through river channelization and dam construction have potentially affected this species throughout its range although actual effects are not known and being studied.

5.72 **Endangered Species Act Consultation**.

1. Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, requires that, "Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried, out by such agency . . . Is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species . . . ."

2. Because no Federally listed species occur within the project area, no Biological Assessment has been prepared for this project. Therefore, no further Section 7 consultation under the Endangered Species Act is required with FWS.

5.73 **Bald Eagle**.

1. Three bald eagle nests exist in close proximity to the project area; all three were active in 2008 (FWS, 2009). The bald eagle was removed from the List of Endangered and Threatened Species in August 2007, but recommendations to minimize potential project impacts to the bird and its nest are provided in the FWS National Bald Eagle Management Guidelines publication. The bald eagle continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act. The FWS developed the National Bald Eagle Management Guidelines to provide landowners, land managers, and others with information and recommendations to minimize potential project impacts to bald eagles, particularly where such impacts may constitute "disturbance," which is prohibited by the Bald and Golden Eagle Protection Act. Those guidelines recommend (a) maintaining a specified distance between the activity and the nest (buffer area), (b) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. Specifically, construction activity is prohibited within 660 feet of an active nest during the nesting season (May 1 – October 15), work cannot damage any part of a nesting tree, and no tree clearing should occur within 330 feet of a nest tree.

2. The bald eagle is a very large raptor. Adults possess a dark brown body, white head and tail, and large yellow bill. Immatures are dark brown with pale underwing coverts and irregular light base of tail; the bill is black. Subadults are intermediate between immatures and adults and exhibit various amounts of white mottling on the body; 4 to 5 years are required to attain adult plumage. The lifespan of a bald eagle can range from 30 to 50 years. They feed in open lakes on self-caught or robbed fish. They also consume waterfowl, coots, muskrats, and nutria.

3. In Louisiana, the bald eagle typically nests from October to mid-May. Their nests are very large (up to 2.5 meters (m) [8.2 feet] across and 3.5 m [11.5 feet] deep) and are often used year after year. Following nesting activities in autumn, egg laying/incubation and hatching/rearing of young typically occur between fall and spring, with fledging of young as early as January and typically by mid-May (FWS, 2007a, 2007b). Bald eagle nests typically are in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh and intermediate marshes or open water. Breeding bald eagles occupy "territories" that they will typically defend against

intrusion by other eagles and that they likely return to each year. A territory may include one or more alternate nests that are built and maintained by the eagles, but which may not be used for nesting in a given year. Potential nest trees within a nesting territory may, therefore, provide important alternative bald eagle nest sites. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that may weigh more than 1,000 pounds. Most nests are located in the upper 30 feet of the tree; the cone-shaped nest may be 6 to 8 feet in diameter and 6 to 8 feet from top to bottom. Nest sites typically include at least one perch with a clear view of the water or area where the eagles usually forage. Shoreline trees or snags located near large water bodies provide the visibility and accessibility needed to locate aquatic prey. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during this critical period may lead to nest abandonment, cracked and chilled eggs, and exposure of small young to the elements. Human activity near a nest late in the nesting cycle may also cause flightless birds to jump from the nest tree, thus reducing their chance of survival.

WATER QUALITY AND GROUND WATER

Surface Water Quality

5.74 Section 303(d) of the Clean Water Act 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, the Louisiana Department of Environmental Quality (LDEQ) has prescribed water quality standards for surface waters within the State of Louisiana in order to promote a 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 range, temperature, bacterial density, DO, chloride concentration, sulfate concentration, and total dissolved solids. 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 include 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, total dissolved solids, 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. This is closely monitored by the Plaquemines Parish Health Department, particularly in support of the significant area oyster industry.

5.75 The Plaquemines Parish NFLs are located in the Barataria Basin west of the Mississippi River. The protected side of the NFL primarily contains residential, agricultural, and pasture land while the flood side of the NFL is bordered by marsh and open water. The NFLs cross three subsegments of the Barataria Basin: Bayou Barataria and Barataria Waterway; Wilkinson Canal and Wilkinson Bayou; and Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere. All three subsegments are classified by the State of Louisiana as estuarine systems (Environmental Regulatory Code Title 33, Part IX, Subpart 1, Chapter 11, Table 3, October 2010). The State of Louisiana defines an estuary as “an area where freshwater systems and saltwater systems interact.”

5.76 The Bayou Barataria and Barataria Waterway segment contains all of NFL Section 1 and parts of NFL Sections 2 and 3. The State of Louisiana lists the designated uses for the Bayou Barataria and Barataria Waterway segment as primary contact recreation, secondary contact recreation, and fish and wildlife propagation. The Wilkinson Canal and Wilkinson Bayou segment contains parts of NFL Sections 2 and 3. The designated uses for Wilkinson Canal and Wilkinson Bayou segment are primary contact recreation, secondary contact recreation, fish and wildlife propagation, and oyster propagation. The Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere segment contains all of NFL Sections 4 and 5 and a small portion of NFL Section 3. The designated uses for Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere are primary contact recreation, secondary contact recreation, fish and wildlife propagation, and oyster propagation. These segments of the Barataria Basin are located in oyster harvest area 12 (Louisiana Department of Health and Hospitals).

5.77 Water quality data for the three sub-segments were obtained from the Louisiana Department of Environmental Quality's Ambient Water Quality Monitoring database. The data were retrieved from LDEQ's Ambient Water Quality Database. Tables 5-8, 5-9, and 5-10 provide the average, maximum, and minimum values for the available data. The 10th, 25th, 50th, 75th, and 90th percentiles were also calculated for the available data. The State of Louisiana has developed numeric criteria specific to estuaries for turbidity, pH, dissolved oxygen, and water temperature. These numeric criteria apply to all estuaries except where site specific values have been given. Site specific values have been given by the State for all three sub-segments for DO, pH, and temperature. The site specific criteria are provided in the Tables 5-8, 5-9, and 5-10. The state has not developed site specific criteria for chloride, sulfate, and total dissolved solids. The site specific criteria from the state for these categories are listed as not available at present (N/A). The tables also display this information. The numeric criteria for fecal coliform for each segment are included in the tables. Bayou Barataria and Barataria Waterway (Table 5-8) contain the fecal coliform requirements for the segment's designated use of primary contact recreation. The numeric criteria for fecal coliform for Wilkinson Canal and Wilkinson Bayou; and Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere are for the designated use of oyster propagation (Tables 5-9 and 5-10).

5.78 For the Bayou Barataria and Barataria Waterway subsegment, data were obtained from ambient water quality site number 899, Barataria Waterway Lafitte. The data are provided in Table 5-8. Only turbidity had a maximum value that exceeded the State's requirements of 50 NTUs for estuaries. Further analysis of the turbidity data shows that 90 percent of the time the turbidity is within the state's standard of 50 NTUs. All other parameters were within the values required by the state.

5.79 Water quality data for Wilkinson Canal and Wilkinson Bayou were obtained from ambient water quality site number 908, Wilkinson Bayou, North of Barataria Bay. The data are shown in Table 5-9. Although the maximum observed value exceeds 50 NTUs, more than 90 percent of the samples for turbidity were within the State's standard. The Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere subsegment had ambient water quality station number 909, Bayou Dulac, West of Bay Sanbois. The data are shown in Table 5-10. All the parameters which have numerical criteria from the State, meet the standards. Overall, the water quality for the three subsegments is good.

Table 5-8
BAYOU BARATARIA AND BARATARIA WATERWAY AMBIENT DATA
(ALL OF SECTION 1 AND PORTIONS OF SECTIONS 2 AND 3)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
ALKALINITY (mg/L)	35	76.2	38.4	54.0	63.0	81.5	89.5	95.3	104.0	
AMMONIA NITROGEN (mg/L)	17	0.18	0.10	0.10	0.10	0.14	0.24	0.32	0.38	
CHLORIDE (mg/L)	35	1,954.2	44.0	51.7	89.4	1,484.0	3,314.5	4,826.4	8148.0	N/A
COLOR (PCU)	24	39	22	26	30	37	50	54	55	
DO (mg/L)	33	9.13	4.03	5.91	6.44	8.13	9.83	12.59	30.13	3.8 June-Aug.; 4.0 Sept.- May
DO, PCT SAT	22	114%	71%	85%	90%	101%	134%	147%	201%	
FECAL COLIFORM (COL/100mL)	35	101	4	10	27	70	114	206	800	See Note Below
HARDNESS (AS CACO3) (mg/L)	35	759.8	81.2	104.8	131.0	506.0	1,198.5	1,708.4	3,335.0	
NITRATE+NITRITE NITROGEN (mg/L)	32	0.29	0.03	0.05	0.13	0.21	0.39	0.49	1.11	
NITROGEN, KJELDAHL (mg/L)	35	0.96	0.32	0.46	0.72	0.94	1.22	1.47	1.73	
pH	34	7.48	6.87	7.09	7.22	7.50	7.69	7.83	8.12	6.5-9.0
PHOSPHORUS (ASP) (mg/L)	33	0.144	0.090	0.100	0.110	0.140	0.160	0.180	0.300	
SALINITY (ppt)	33	3.50	0.17	0.19	0.27	2.87	5.70	7.80	15.90	
SECCHI DISK (in.)	22	17	8	9	10	16	22	25	26	
SPECIFIC CONDUCTANCE, FIELD (umhos/cm)	32	5,383	3	45	405	965	10,102	13,850	25,760	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	35	6,334	344	407	534	5,110	9,825	15,020	29,560	
SULFATE (mg/L)	35	277.2	24.0	28.9	33.6	198.0	451.0	6,71.2	1,205.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	35	3,725.8	214.0	249.2	293.0	2,664.0	5,750.0	8,912.0	17,780.0	N/A

TABLE 5-8 (Cont)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
TOTAL ORGANIC CARBON (mg/L)	23	11.9	7.7	9.3	10.9	11.7	12.8	14.5	16.0	
TOTAL SUSPENDED SOLIDS (mg/L)	35	29.2	4.0	10.4	14.5	25.0	35.5	53.0	69.0	
TURBIDITY (NTU)	35	23	9	10	13	16	30	42	67	50 NTUs
WATER TEMPERATURE (degrees C)	34	22.6	9.7	13.9	17.2	22.8	29.4	31.1	32.0	35 degrees C

NOTE: Median MPN shall not exceed 14 fecal coliforms/100 mg/L and no more than 10 percent of samples shall exceed 43MPN/100 mg/L.

TABLE 5-9
WILKINSON CANAL AND WILKINSON BAYOU AMBIENT DATA
(PORTIONS OF SECTIONS 2 AND 3)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
ALKALINITY (mg/L)	34	95.2	49.4	62.2	75.0	96.7	112.5	124.8	143.0	
AMMONIA NITROGEN (mg/L)	18	0.15	0.10	0.10	0.10	0.13	0.19	0.23	0.31	
CHLORIDE (mg/L)	34	6,475.7	416.0	1,691.0	3,298.0	6,104.5	9,045.3	11,832.9	15,324.0	N/A
COLOR (PCU)	22	32	19	22	25	30	39	49	50	
DO (mg/L)	34	7.33	4.36	5.38	6.08	6.92	8.89	9.75	11.90	3.8 April-Aug.; 5.0 Sept.-March
DO, PCT SAT	23	91.0%	74.3%	83.6%	87.0%	90.2%	94.7%	103.9%	110.4%	
FECAL COLIFORM (MPN/100mL)	32	18	2	2	8	10	27	35	80	See Note Below
HARDNESS (AS CACO3) (mg/L)	34	2,331.3	204.0	575.4	1,143.3	2,144.0	3,326.0	4,223.9	5,278.0	
NITRATE+NITRITE NITROGEN (mg/L)	18	0.16	0.04	0.05	0.05	0.09	0.16	0.33	0.92	
NITROGEN, KJELDAHL (mg/L)	31	0.91	0.40	0.51	0.65	0.88	1.15	1.30	1.56	
pH	34	7.71	7.12	7.33	7.53	7.68	7.91	8.14	8.24	6.5-9.0
PHOSPHORUS (AS P) (mg/L)	31	0.108	0.070	0.070	0.080	0.100	0.130	0.150	0.190	
SALINITY (ppt)	34	11.77	0.90	3.56	6.10	11.08	16.87	21.21	27.50	
SECCHI DISK (in.)	15	20	10	12	16	17	24	28	35	

TABLE 5-9 (Cont)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
SPECIFIC CONDUCTANCE, FIELD (umhos/cm)	34	19,119	3	5,127	10,810	18,809	27,490	34,177	42,880	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	34	19,838	1,703	6,654	11,553	18,830	27,513	35,070	43,070	
SULFATE (mg/L)	34	908.3	70.5	263.6	458.8	882.5	12,86.8	1,633.0	2,259.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	34	12,101.9	921.0	3,647.4	6,085.0	11,390.0	16,402.5	22,550.0	28,500.0	N/A
TOTAL ORGANIC CARBON (mg/L)	22	9.8	7.3	7.5	8.4	9.6	10.9	13.0	13.8	
TOTAL SUSPENDED SOLIDS (mg/L)	34	38.2	12.7	19.2	23.6	30.5	42.0	60.5	125.0	
TURBIDITY (NTU)	34	23	7	9	12	17	24	39	115	50 NTUs
WATER TEMPERATURE (degrees C)	34	22.0	9.0	11.5	17.5	22.8	28.1	30.9	31.5	35 degrees C

NOTE: Median MPN shall not exceed 14 fecal coliforms/100 mg/L and no more than 10 percent of samples shall exceed 43MPN/100 mg/L.

TABLE 5-10
BAY SANSBOIS, LAKE JUDGE PEREZ, AND BAY DE LA CHENIERE AMBIENT DATA
(ALL OF SECTIONS 4 AND 5 AND PORTIONS OF SECTION 3)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
ALKALINITY (mg/L)	24	128.9	94.2	104.0	114.8	125.0	147.5	156.0	170.0	
AMMONIA NITROGEN (mg/L)	15	0.14	0.10	0.10	0.10	0.10	0.14	0.25	0.36	
CHLORIDE (mg/L)	23	8,827.9	1,610.0	3,846.0	6,055.0	9,576.0	11,259.0	11,927.0	13,390.0	N/A
COLOR (PCU)	11	40	21	24	26	49	50	55	55	
DO (mg/L)	23	6.81	4.77	5.17	5.82	6.52	7.84	8.47	9.83	4.0
DO, PCT SAT	12	87.8%	80.1%	84.2%	86.4%	87.3%	90.1%	91.8%	92.8%	
FECAL COLIFORM (MPN/100mL)	22	10	2	2	2	10	10	13	54	See Note Below
HARDNESS (AS CACO3) (mg/L)	23	3,381.7	780.0	1,644.0	2,450.0	3,972.0	4,232.0	4,520.2	4,946.0	
NITRATE+NITRITE NITROGEN (mg/L)	12	0.05	0.02	0.03	0.03	0.05	0.05	0.07	0.08	
NITROGEN, KJELDAHL (mg/L)	20	1.04	0.52	0.59	0.72	1.03	1.31	1.47	1.56	
pH	23	7.66	7.27	7.40	7.55	7.68	7.80	7.88	7.96	6.5-9.0
PHOSPHORUS (ASP) (mg/L)	19	0.116	0.070	0.090	0.100	0.100	0.140	0.152	0.180	
SALINITY (ppt)	23	17.49	6.82	8.92	13.95	19.73	21.25	21.90	25.60	
SECCHI DISK (in.)	11	25	10	16	19	24	32	33	44	
SPECIFIC CONDUCTANCE, FIELD (umhos/cm)	23	28,253	11,923	15,307	23,109	31,707	33,775	34,828	40,140	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	23	28,693	12,700	17,120	23,950	31,800	33,450	35,480	39,000	
SULFATE (mg/L)	23	1,280.1	426.0	623.0	878.5	1,368.0	1,541.5	1,776.8	2,216.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	23	17,907.1	6,840.0	9,024.0	14,800.0	19,520.0	21,090.0	23,132.0	25,333.0	N/A
TOTAL ORGANIC CARBON (mg/L)	11	11.6	7.4	8.8	10.6	11.5	13.5	14.2	14.4	
TOTAL SUSPENDED SOLIDS (mg/L)	23	30.7	9.2	15.7	18.1	29.0	37.3	51.6	72.0	
TURBIDITY (NTU)	23	16	6	8	11	13	20	23	39	50 NTUs
WATER TEMPERATURE (degrees C)	23	22.4	9.5	12.2	17.6	24.1	28.0	30.9	33.5	35 degrees C

NOTE: Median MPN shall not exceed 14 fecal coliforms/100 mg/L and no more than 10% of samples shall exceed 43MPN/100 mg/L.

5.80 The final *2006 Louisiana Water Quality Inventory: Integrated Report* contains the most recent Section 303(d) List that has been approved by the EPA. The 2008 Section 303(d) List has been submitted by LDEQ to the EPA, but the 2008 Section 303(d) List has not been approved. The 2010 Section 303(d) List has been completed by LDEQ and is currently under public review. The 2006 Section 303(d) List reports no impairments for Bayou Barataria and Barataria Waterway; and Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere. The 2006 Section 303(d) List reports Wilkinson Canal and Wilkinson Bayou as being impaired. Wilkinson Canal and Wilkinson Bayou is listed as impaired for fecal coliform and not meeting the bacteria requirements for the sub-segments designated use of oyster propagation. The suspected causes of the impairment are managed pasture grazing, marina/boating sanitary on-vessel discharges, and sewage discharges from unsewered areas. The LDEQ has classified the subsegment as IRC-5 or needing a TMDL for the water quality impairments. The water quality of Wilkinson Canal and Wilkinson Bayou has varied since the 2006 Section 303(d) List. The 2008 Section 303(d) List had the subsegment listed as meeting its designated use of oyster propagation and not impaired for fecal coliform. The 2010 Section 303(d) List shows that Wilkinson Canal and Wilkinson Bayou have once again not met the bacteria requirements for fecal coliform required for supporting the designated use of oyster propagation. The suspected causes are listed as managed pasture grazing, septic systems and decentralized sewer systems, and wildlife other than waterfowl. The LDEQ has classified the sub-segment as IRC-5 and needing a Total Maximum Daily Load (TMDL) for the specific water quality impairment. The priority for developing a TMDL for this subsegment is listed in the 2010 Section 303(d) as low.

Ground Water

5.81 Ground water is artificially lowered within the protected area by a surface drainage system. A network of ditches and canals within the levee-protected area channels ground water and stormwater to pump stations. Pump stations, located along the non-Federal back levee, pump the water directly into outfall canals and sloughs in the marsh. No stormwater is pumped into the Mississippi River. Plaquemines Parish is the entity responsible for local drainage.

AIR QUALITY

5.82 Plaquemines Parish is classified as attainment for all of the National Ambient Air Quality Standards (NAAQS) (Environmental Protection Agency, 2009). Based on the Clean Air Act of 1963, NAAQS have been established for seven pollutants--carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and two sizes of particulate matter (PM) (PM 10 – diameter 10 microns and less, and PM 2.5 - diameter 2.5 microns and less). The attainment status for the parish is the result of area-wide air quality modeling studies. Thus, no Conformity Determination or other effort is required of the proposed action.

5.83 Air quality throughout the project area is good due to the rural nature of most of the area. While small to moderate emission sources are in evidence, none constitute a major air emissions source. Industry or emission sources are located along the Mississippi River deep draft

waterway at a number of anchorage facilities within the Port of Plaquemines. The Conoco-Phillips Alliance refinery in Section 2 is an industrial emission source. Highway LA-23 and the Union Pacific Railroad spur are linear transportation facilities that traverse part or all of the project area and carry substantial vehicular or train traffic with resultant emissions. There are also several pump stations in the project area that contribute minor emissions when in use.

CULTURAL RESOURCES

5.84 Plaquemines Parish lies within Management Unit V as defined by Louisiana's Comprehensive Archaeological Plan (Smith, et al., 1983). This management unit is defined based on commonalities of geography, culture, and economic development. Management Unit V is characterized by landscapes of the Lower Mississippi River valley which are dominated by "low-lying swamp land, natural and manmade levees, and coastal marsh" (Smith. et al., 1983:93). Background research associated with the proposed NFL project, located on the west bank of the Mississippi River in Plaquemines Parish was conducted at the Division of Archaeology (e.g., site forms and cultural resource surveys) and the Division of Historic Preservation/State library (historic standing structures) in Baton Rouge, Louisiana. In addition, a search of the National Register of Historic Places (NRHP) online database and the Louisiana NRHP was required for many of the sites and structures within the project area. This background review encompassed a 1.6-kilometer (km) (1 mile) area of potential effects surrounding the proposed project area.

5.85 Thirty-eight previously recorded archeological sites were identified within 1.6 km (1 mile) of the proposed NFL project in Plaquemines Parish--only Site 16PL153 (Citrus Lands; brick foundations) was positioned within the footprint of one of the early alternative alignments (alignments prior to recent authority guidance limiting the project to the replacement of modification of existing levees). Thirty-seven sites contain historic components; however, one site displays evidence of both historic and prehistoric occupations (Site 16PL12), while Sites 16JE48 and 16PL34 are strictly prehistoric in age. The majority of the historic period sites are mid- to late 19th century through to the early 20th century (n=22); several 19th century occupations (n=4) and 20th century assemblages (n=3) were also represented. In addition, a number of potential 17th to 18th century sites were identified (Sites 16PL27, 16PL127, 16Pl146, and 16PL157). Typical historic resources identified include plantation houses and ancillary structures (i.e., cisterns, overseer's house, slave cabins, sugar mill ruins, and tenant quarters), brick foundations and rubble, and a church and cemetery, including crypts, iron and pipe crosses, iron and concrete markers/crosses, and gravestones.

5.86 The three prehistoric archeological sites are represented by a shell midden (Site 16JE48), prehistoric scatter (16PL34), and an earthen mound (Site 16PL12). Cultural materials encountered at the earthen mound suggest a Plaquemines affiliation (about A.D. 1200-1540). In general, the historic period archeological sites were located along the Mississippi River natural levee (n=27) and batture (n=8), with much lower frequencies noted for site placement in the back swamp (n=2) or on the delta (n=1). Concerning the three prehistoric period sites, they were recorded along the natural levee of the Mississippi River.

5.87 The majority of the sites were considered Not Eligible (n=12) or were Not Assessed (n=20) by the researchers (82 percent). Three of the sites have been listed in the NRHP, including Fort de la Boulaye (16PL027; 1966), Harlem Plantation (16PL084; 1982), and Woodland Plantation (16PL157; 1998). Fort de la Boulaye (Fort of Mississippi) is also a National Historic Landmark. An additional four sites were considered Eligible for listing in the NRHP--Sites 16PL125, 16PL126, 16PL141, and 16PL165.

5.88 Six historic standing structures have been documented within the 1.6-km (1 mile) buffer surrounding the NFL project in Plaquemines Parish; none of these structures are located within the footprint of the current alignment alternatives. The structures represent a wide construction date ranging from about 1810 to 1917; a single structure (58 [38-005]) was not assigned a construction period. The structure inventory includes plantation houses (n=3), residential structures (n=2), and single examples of the Plaquemines Parish Courthouse and a commercial grocery store (Palazzo's). The housing styles represented are Anglo Folk/ Vernacular (n=4) and Public Architecture (n=2). The Anglo Folk/Vernacular buildings all display central halls and two have four rooms. As of 1983, the buildings were described as being in Good (n=2) or Poor (n=4) condition. Two of these structures (Woodland and Harlem Plantation Houses) are also listed in the NRHP.

5.89 Within the 1.6-km (1 mile) radius surrounding the NFL project in Plaquemines Parish, four properties have been listed in the NRHP; none of these properties lie within the footprint of the any of the alignment alternatives. One of the listed properties (Fort de la Boulaye) is a National Landmark; the other properties (two plantations and a catholic church) are recognized for their architecture. Harlem Plantation displays French Creole influence, while St. Patrick's Catholic Church is noted for its Gothic Revival architecture. Finally, Woodland Plantation provides notable examples of Greek Revival, Italianate, and Gothic Revival architecture. Their periods of significance span from the early 1700s (Fort de la Boulaye) to the mid-1920s (St. Patrick's Catholic Church).

RECREATION

5.90 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. Recreational resources are publicly significant because of the high value that the public places on fishing, hunting, and boating, as measured by the large number of fishing and hunting licenses sold in Louisiana, and the large per-capita number of recreational boat registrations in Louisiana.

5.91 The most numerous developed recreational facilities available to the public in the project area are boat launches and marinas. Private camps are also found in the vicinity of the project area.

5.92 Local recreation activities are oriented toward hunting, fishing, and use of private camps. In the project area, recreational activities include fishing, birdwatching, and other passive recreational pursuits. Throughout all of the sections, fishing and hunting are fairly common recreational activities most of which takes place outside the protection system.

Section 1

5.93 Most recreational use in Section 1 includes fishing in the Ollie Canal by some who live in the nearby neighborhoods. There are no public boat launch facilities in this area.

Section 2

5.94 Recreational fishing takes place in the area south of the proposed alignments. Access to any of these areas is by boat.

Section 3

5.95 On the border of Sections 2 and 3 is Wilkinson Canal which is the location of the Myrtle Grove Marina. Camps on stilts with boat hangers line this canal. The marina is located on the unprotected side of the project alternatives.

Section 4

5.96 Lake Hermitage Marina is located several miles off Highway LA-23. It too is located outside the proposed levee system. Camps were once abundant along this drive, but many were destroyed by Hurricane Katrina.

Section 5

5.97 West Point a la Hache Marina is situated on the south side of the proposed protection system along Grand Bayou.

ESTHETIC (VISUAL) RESOURCES

5.98 This resource is institutionally important because of the laws and policies that affect visual resources, most notably the 1969 National Environmental Policy Act. Visual resources are publicly and technically important because of the high value placed on the preservation of unique natural and culture landscapes.

5.99 Large bodies of water serve as an important element of visual composition because of their horizontal extent, color and texture. The sinuosity of these bodies of water provide the additional visual characteristic of surprise, especially in areas where view sheds open up to reveal water features hidden in dense vegetation. View sheds are not only offered from local highways and streets, but also from the back porches and kitchen windows of the residents that live in the area.

5.100 The primary thoroughfare within the study area is LA-23. This thoroughfare runs the length of and parallel to the Mississippi River. View sheds to the river, along this thoroughfare, are already limited due to the existing levees and other flood protection systems. View sheds into the marshlands and swamps are also equally limited due to the existing levees and other flood protection systems. These thoroughfares are the primary means of public visual appreciation throughout the project area. The local residents, other than those in the vicinity of Oakville and Myrtle Grove, typically live on the flood side of the existing levees in camps and will most likely not be affected (visually) by any proposed work on the existing levee system.

5.101 The landscape of the region is dominated by fields and marshland with a mixture of water tolerant vegetation and some forestation. Land uses in the vicinity focus on industrial and agricultural with some low density single-family residential lightly spread throughout the project area.

HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE (HTRW)

5.102 There must be reasonable identification and evaluation of all HTRW contamination within the vicinity of the proposed action. Engineer Regulation 1165-2-132 identifies the USACE policy to avoid the 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 regulated), pollutants and other contaminants, which are not regulated under the Comprehensive Environmental Response, Compensation, and Liability Act, would be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation.

5.103 An American Society for Testing and Materials Phase I Environmental Site Assessment (ESA) was completed for the project area July 2009. The Phase I ESA documented the Recognized Environmental Condition for the project area. Nineteen sites were recommended for additional sampling. Of the 19 sites recommended by the contractor for additional sampling, only 5 of the sites are located within the proposed alignment and at the time of construction can be avoided. The HTRW risk is considered low. Additional detailed information can be found in Appendix I.

ENVIRONMENTAL JUSTICE

5.104 The purpose of this section is to provide an objective analysis of Environmental Justice (EJ) issues associated with implementation of proposed NFL replacement or modification in conjunction with the NOV Hurricane Protection Project, identify potential impacts, and determine whether the impact is "disproportionately high or adverse." In response to Executive Order 12898, "Federal Actions to Address *Environmental Justice* In Minority Populations and Low-Income Populations" (February 1994), "*environmental justice"* considerations have become part of the Federal mission in conducting and preparing EISs. The EJ is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

5.105 Executive Order 12898 focuses Federal attention on the environmental and human health conditions in the minority and low-income communities, enhances the provisions of nondiscrimination in Federal programs affecting human health and the environment, and promotes meaningful opportunities to the access of public information and participation in matters relating to minority and low-income communities and their environment. The Executive Order is directed internally to all Federal departments and Federal agency heads to take the appropriate steps to identify and address any disproportionately high and adverse human health or environmental effects of Federal programs, policies, and activities on minority and low-income populations.

5.106 To determine the potential EJ impacts associated with the project area, impacted resources must be identified. The existing socioeconomic parameters, discussed earlier in this section, provide the basis for this analysis. Of these, two general parameters are examined—minority populations and poverty concentrations.

Minority Population

5.107 "Minority," when related to Census data, refers to racial populations other than Caucasian. Minority groups are specifically identified as those being African American, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. Groups that are considered low income are defined using the Department of Health and Human Services (DHHS) poverty guidelines. In order to identify these and small clustered and dispersed populations, localized census tract data and other information are used. Explicit consideration is required and normally will be found under the social and economic discussions.

5.108 In the analysis of racial composition for the EJ study, only parish statistics were available. Based on census block data, the population of the total study area represented approximately 9.3 percent of the Plaquemines Parish total in 2000. The racial makeup of the parish for the same year was 69.77 percent white, 23.39 percent black or African American, 2.07 percent Native American, 2.62 percent Asian, 0.01 percent Pacific Islander, 0.73 percent from other races, and 1.42 percent from two or more races. Also, 1.62 percent of the population was Hispanic or Latino of any race. For this study, for lack of other data, it is assumed that the racial makeup of the five reaches of the project area basically parallel the parish distribution.

5.109 Population estimates for Plaquemines Parish are presented in Table 5-11 by minority and majority populations.

TABLE 5-11
POPULATION ESTIMATES BY RACE FOR PLAQUEMINES PARISH
FOR YEARS 2000 TO 2009

Area	Total Population			Minority Population a/			Majority Population b/		
	2000	2005	2009	2000	2005	2009	2000	2005	2009
Plaquemines Parish	26,757	28,565	20,942	8,089	8,284	5,927	18,668	20,281	15,015
Caucasian (No.)	-	-	-	-	-	-	18,668	20,281	15,015
Percent (%)	-	-	-	-	-	-	69.8	71.0	71.7
African-American (No.)	-	-	-	6,258	6,627	4,440	-	-	-
Percent (%) c/	-	-	-	23.3	23.2	21.2	-	-	-
Other (No.)	-	-	-	1,831	1,657	1,487	-	-	-
Percent (%)	-	-	-	6.8	5.8	7.1	-	-	-

SOURCE: U.S. Bureau of Census for given years.
a/ Minority population includes all populations except Caucasian (e.g., African American, Hispanic, Latino, Asian, etc.).
b/ Majority population refers to persons of Caucasian race.

Population Below Poverty Level

5.110 The poverty threshold is the minimum level of income deemed necessary to achieve an adequate standard of living in a place. The poverty level is usually determined by making a "needs-based" assessment of the costs of essential resources an average adult person consumes in a year to maintain a tolerable life. The main factors included are food and rent, or housing costs. This section will discuss, according to available Census estimates, the number of people that fall below the poverty level for Plaquemines Parish in an effort to discern any potential "disproportionate" impacts felt by this segment of the population in the region. Natural disasters, like floods and hurricanes, always seem to most severely impact poverty-stricken or poorer individuals and families. Also, those without accumulated wealth have fewer resources or options for dealing with the resulting unexpected losses and disruption in their lives from catastrophic events. Items like flood insurance are often prohibitively expensive for these residents, so when they incur a loss, many times it can be total.

5.111 Estimates of regional income data collected locally for the 2000 Census indicated that almost 23 percent of the population in Plaquemines Parish were living below the poverty level in 1989. That percentage compares to 24 percent for Louisiana. In 2008, the parish population below poverty level was estimated to decrease to 15 percent versus 18 percent for Louisiana. Table 5-12 illustrates the numbers of persons living below poverty levels as compared to statewide numbers by racial population in Plaquemines Parish in 2000.

TABLE 5-12
2008 POPULATION BELOW POVERTY LEVEL
PLAQUEMINES PARISH

Area	Total Population (No.)				Population Below Poverty Level (No.)			
	1979	1989	1999	2008	1979	1989	1999	2008
Louisiana	4,205,900	4,212,000	4,469,000	4,410,796	-	994,032	875,924	776,300
Percent (%)	-	-	-	-	-	23.6	19.6	17.6
Plaquemines Parish	26,049	25,575	26,757	21,276	-	5,780	-	3,213
Percent (%)	-	-	-	-	-	22.6	-	15.1

Source: U.S. Census Bureau for given years, as available.

Population and Housing

5.112 **Project Area Population**.

1. Locations that could have an impact for EJ, as associated with the proposed project, range from industrialized cities to rural communities. For the purposes of this project, the EJ analysis will be primarily focused on those areas in the project area that have available statistics on human habitation (i.e., primarily Section 1, as shown in Table 5-1 and the land use map, Figure 3-1, Section 3 of the EIS). Section 1, which comprises 87 percent of the total project area population and 83 percent of the houses, includes the communities of Oakville (near RM 70.5) and Jesuit Bend, Ollie, Gloria, Naomi, and La Reussite (near RM 64.0). Altogether, the remaining four reaches account for 13 percent of the population and 17 percent of the houses, of which many are camps, vacant, or are not year-round occupied units. These reaches include the smaller communities of Alliance, Ironton, and Myrtle Grove in Section 2 (RMs 62.0 to 59.0); Point Celeste in Section 4 near RM 52.0; and St. Jude in Section 5 near RM 46.0. Although there is not a named community in Section 3, its site is referred to as the Citrus Farm, or Citrus Grove, and its general vicinity is near RM 56.5.

2. Unfortunately, due to their size, there is not enough available information to properly assess the project area communities individually in regard to EJ. However, the objectives of the project include providing a higher level of protection for as many resources as possible. The intent is to implement the replacement or modification of the levees without any "disproportionate adverse" impacts directed toward any ethnical group or segment of the population, but especially not toward any disadvantaged minority or low-income populations. As information is available, should any project impacts be identified that would be considered to negatively affect these populations, they will be addressed in the Environmental Consequences discussion (Section 6 of the EIS).

3. For purposes of the EJ analysis, all census block groups within a 1-mile radius of the Plaquemines Parish NFL were defined as the project impact area for the EJ evaluation. These include the population census blocks displayed in Table 5-1 (Socioeconomics section). Section 1 also comprises the majority of the acreage in the project area. According to the study conducted by Louisiana Speaks, Section 1 includes an estimated 1,110 acres of residential land while most of the residential development in Sections 2 through 5 is rural or small communities situated between LA-23 and the MRL system.

4. Based on U.S. Census Bureau statistics by census block, the latest available detailed data (2000) were used to show the breakdown of population and housing in the project area by reach. Combining all reaches, total population and housing units (including vacant units and camps) were estimated to be approximately 2,500 and 900, respectively, for the year 2000. It should also be noted that total housing unit estimates do not represent total occupied units (i.e., households). Nonetheless, these numbers provide the evaluator with a base estimate for

determining the extent of project impacts associated with the human population of the area. Unfortunately, detailed population data presented by minority and below-poverty level groups were not available by census tract for this analysis. Thus, discussions on minority populations by reach are limited.

5.113 **Population Changes**.

1. Historical population statistics show the fluctuations in the area population over the last decade. Shortly after the 2000 Census, Hurricanes Katrina and Rita struck the area in 2005. Estimates in the project area for both population and housing declined nearly 12 percent in the aftermath of these events, bringing the counts closer to 2,200 people and 800 housing units.

2. Statistics presented in Table 5-13 provide a comparison of historical population figures from 1950 through 2009, as available, for Plaquemines Parish, neighboring Orleans Parish, and the State of Louisiana. As shown, Plaquemines Parish doubled in population from 14,239 in 1950 to 28,565 in 2005, an increase of over 100 percent. However, after the hurricanes hit in 2005, the numbers fell 24 percent in 1 year (2006) and have fallen off every year since. In 2009, Census estimates for the parish were 20,942, a decrease of 22 percent from the Census reports for 2000. These trends paralleled neighboring Orleans Parish for the same years. In 2000, the population of the project area represented about 9.3 percent of the parish total.

TABLE 5-13
POPULATION FOR PLAQUEMINES PARISH AND REGION
FOR THE YEARS 1950-2009

Population and Percentage Change a/									
Historical: Years 1950-1990									
Area	1950	% Chg 1950-1960	1960	% Chg 1990-2000	1970	% Chg 1970-1980	1980	% Chg 1980-1990	1990
Louisiana	2,683,500		3,257,000		3,641,300		4,205,900		4,212,000
Plaquemines Parish	14,239	58.3	22,545	11.9	25,225	0.3	26,049	-0.2	25,575
Orleans Parish	570,445		627,525		593,471		557,515		496,938
Historical: Years 2000-2009									
Area	% Chg 1990-2000	2000	2005	2006	% Chg 2005-2006	2008	2009	% Chg 2000-2009	Overall % Chg 2000-2009
Louisiana	8.3	4,469,000	4,495,627	4,243,634		4,410,796	4,492,076		
Plaquemines Parish	4.6	26,757	28,565	21,610	-24.4	21,276	20,942	-21.7	
Orleans Parish	-2.5	484,674	455,046	210,768		311,853	354,850	-26.8	

SOURCE: U.S. Bureau of Census.
a/ Percent Change denoted as % Chg.

5.114 **Population by Race and with Projections**.

1. According to U.S. Census Bureau estimates in 2000, a study conducted by the State of Louisiana shows population projections by race for Plaquemines Parish from 2005 through 2030 (Table 5-18). Discussed in detail at www.louisiana.gov, these projections are based on Mid-Series net migration scenarios, birth and death rates from vital statistics records, and the rate of growth from 2000 to 2005 (prior Katrina numbers), which was assumed to remain constant through 2030. Based on these projections, the population of Plaquemines Parish will grow very slowly (0.1 percent overall), only reaching 29,130 by 2030.

2. According to U.S. Census Bureau estimates in 2000, the racial makeup of Plaquemines Parish was 69.77 percent white, 23.39 percent black or African American, 2.07 percent Native American, 2.62 percent Asian, 0.01 percent Pacific Islander, 0.73 percent from other races, and 1.42 percent from two or more races. Also, 1.62 percent of the population was Hispanic or Latino of any race.

3. More recent statistics, shown in Table 5-14, were obtained from the State of Louisiana, which shows population projections by race for Plaquemines Parish from 2005 through 2030. Discussed in detail at www.louisiana.gov, these projections are based on Mid-Series net migration scenarios, birth and death rates from vital statistics records, and the rate of growth from 2000 to 2005 (prior Katrina numbers), which was assumed to remain constant through 2030. Based on these projections, the population of Plaquemines Parish will grow very slowly (0.1 percent overall), only reaching 29,130 by 2030.

TABLE 5-14
POPULATION PROJECTION DATA BY RACE FOR
PLAQUEMINES PARISH FOR THE YEARS 2005-2030

Area	2005 (Actual) a/	Projected Population Estimates by Decade						
		2005 (Estimated) a/	2010	2015	2020	2025	2030	Overall % Chg 2005-2030 b/
Total Population (No.)	28,565	28,970	22,440	24,090	25,770	27,460	29,130	0.1
Caucasian (No.)	20,281	20,570	15,780	16,990	18,340	19,650	20,850	1.4
Percent c/	71.0	71.0	70.3	70.5	71.2	71.6	71.6	-
African American (No.)	6,627	6,730	4,910	5,200	5,370	5,550	5,710	-15.6
Percent c/	23.2	23.2	21.9	21.6	20.8	20.2	19.6	-
Other (No.)	1,657	1,670	1,750	1,900	2,060	2,260	2,570	53.9
Percent c/	5.8	5.8	0.08	7.9	8.0	8.2	8.8	-

Source: U.S. Census Bureau data projected by Louisiana government (www.louisiana.gov).
a/ Actual and estimated projections for 2005 will differ.
b/ Percent changed in projected numbers from the year 2005 to 2030.
c/ Percent of total parish population.

4. During the same period (2005 to 2030), the racial breakdown of the population will also remain close to the same as the numbers for the total population. In 2005, the Caucasian or majority population was estimated to comprise 71 percent with the remaining minority population made up of 23 percent African-American and 6 percent other. In 2030, the Caucasian population remains the same, the African-American population is projected to be 20 percent, and the other minorities are expected to comprise 9 percent.

5.115 **Housing**. Information on housing values and the number of units provides insight into the social developments that reflect the economic geography of the area. Table 5-15 presents various housing characteristics reported by the Bureau of Census. As shown, while housing units have grown over the last decade, the number of persons per household (PPH) has decreased slightly. This follows a trend toward smaller households that has been occurring across the Nation since the 1970s. The median household income for Plaquemines Parish was estimated to be $50,948 in 2009, which is significantly higher than the state. The median value of households was also higher than the state in 2009 ($110,100 for the parish versus $85,000 for the state, in current year dollars).

TABLE 5-15
HOUSING STATISTICS FOR PLAQUEMINES PARISH
FOR GIVEN YEARS

Area	Total Housing Units (No.)		Total Occupied Housing Units (Households) (No.)		PPH (No.) a/		Median Household Income ($) b/		Med Value of Households ($) b/	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
Louisiana	1,706,000	1,963,536	4,205,900	1,656,053	2.62	-	32,566	43,635	-	85,000
Plaquemines Parish	9,001	9,282	-	9,021	2.89	2.86	27,133	50,948	-	110,100

SOURCE: U.S. Bureau of Census for the given years.
a/ Persons per household.
b/ Values in current year dollars.

5.116 **Retail Business**. Although there are only a few retail businesses in the project area, small rural towns and communities generally struggle to compete with the variety of goods and competitive prices available in larger towns, cities, or urban areas. Local retail also depends on a steady stream of local wages for survival. However, when flooding or like events, curtails retailers' availability of supply and affordability for local residents, many small businesses are unable to withstand the loss of income and are forced to close or leave the area. The additional threat of levee failure would be catastrophic to this type of business activity.

5.117 **With No Project Improvements**.

1. Residents and businesses in the region of the project area are aware that, due to the topography of the land and the climatic conditions prevalent in the region, levee breach and flooding are very real threats. In addition, each year, an estimated 4 to 10 named hurricanes, of which half normally traverse the Gulf of Mexico, potentially threaten the New Orleans region.

Thus, there is at least one hurricane event annually that endangers the levee system. Inhabitants of the area live with the fear that the levee could fail or floods can occur that jeopardize their physical and economic welfare. With or without additional protective measures to strengthen the existing levees, they may or may not be prepared or protected if another major natural disaster event occurs.

2. Flooding and other such events can curtail the economic resources of an area, especially small rural communities like those in the project area. The potential disruption of jobs, loss of incomes, availability and affordability of supplies, and the initial evacuation itself may force local residents and small businesses to close or relocate. In the wake of events such as these, lives are lost or disrupted, livelihoods are devastated, businesses are ruined, transportation corridors are broken, economies are shattered and natural resources are extensively damaged—these are only to mention a few of the potential detrimental impacts that could last for months or may never return to normal.

3. Impacts from the dual hurricane events in 2005 (Katrina and Rita) weakened and overtopped the existing levees causing widespread devastation to all of southeast Louisiana, including the NFL project area. The potential for future natural disasters such as these, and the flooding that ensues, makes stabilization and upgrading the total levee system a crucial priority in minimizing threats to life, property, and other resources. In the NFL project area (Plaquemines Parish) alone, Louisiana Speaks estimated damages of over $175 million to the levees and pump stations from Hurricanes Katrina and Rita. These storm events also impacted approximately 2,500 people, 900 residences, and 17,000 acres of agricultural and other lands.

4. Without completion of the project objectives, the region is susceptible to a recurrence of such adverse impacts as felt after Hurricanes Katrina and Rita. Since the NFL project area is on the lower end of the Mississippi River and areas of it lie as much as 5 feet, NGVD, below sea level, not only is it threatened by a flood from a severe storm event, it is also susceptible to additional risks caused by drainage flow from upstream water sources. In this event, flood risks are intensified and most residences, businesses, industries, commerce, roadways, and other socioeconomic activities, as well as, environmental resources in the project area are significantly endangered or lost.

5. The Corps has been working with the local citizenry and both local and Federal organizations to identify, design, and provide feasible levee alternatives to protect and reduce, as much as possible, future damage from major storm events.

5.118 **With-Project Improvement**. One of the main features of the proposed alternatives is to upgrade approximately 30 miles of the existing NFL levees to provide a closed levee resulting in elevations ranging from 7.5 to 13.0 feet, NGVD, at the upper to lower ends, respectively, of the project area. The design also requires reconstruction of 2 miles of earthen levee from ground level. Another option is a tie-in to the NOV levee in the event the funds are insufficient for work along the entire 30 miles. These replacements or modifications will provide flood risk reduction to both human and biological resources. Project objectives are to (a) reduce risk to public safety

from catastrophic storm inundation, (b) reduce damages from catastrophic storm inundation, (c) avoid and minimize impacts to existing residential or commercial structures, (d) minimize impacts to existing stormwater drainage canals, and (e) conserve accessibility to existing flood-side residential areas or commercial facilities.

5.119 **Environmental Justice Considerations**.

1. Executive Order 12898, adopted in 1994, requires Federal agencies to identify and address any adverse effects of Federally funded projects that are "disproportionately" high on minority and low-income populations as part of the EJ analysis. This effort helps ensure that the residents in the project area are considered fairly and without discrimination based on race or income.

2. The EJ assessment also examines and confirms that expectations for community participation associated with the project were available. Low-income and minority populations are to be provided every reasonable opportunity to know, understand, and participate in public processes related to Civil Works projects affecting the environments where they reside. Several outreach activities occurred in the project area offering opportunities for both information exchange and input from area residents, businesses, and communities.

5.120 **The EJ Assessment**.

1. The potential impacts of the project (i.e., the proposed action) were addressed in the context of how they would affect the minority or low-income populations. Considering the project's purpose and need, the impacts were reviewed according to their potential for minority communities to gain or lose intended benefits from project completion. Next, it was determined whether these benefits or losses would be disproportionate in regard to minority or low-income populations.

2. In the EJ analysis of the NFL project area, the impacts were evaluated utilizing the demographic and economic data deemed relevant to the project area. Based on the socioeconomic indicators, it was determined that the project area was determined to have a majority Caucasian population of 71 percent compared to an African American population of 22 percent in 2005. Other races comprised 7 percent. Projections from the State of Louisiana indicate this proportion will remain nearly the same over the next 20 years (to the year 2030). In an examination of income statistics, although the PCI of Plaquemines Parish was slightly lower than the New Orleans MSA, it paralleled the State of Louisiana in 2000 ($15,937 versus $16,912, presented in 1999 dollars). Also, the median household income of the parish and census tract 504 (representing the project area) was higher than New Orleans in 2000. Thus, it was determined that the majority of the project area was not low income. Although the demographics do not represent a minority or low-income population in the project area, project impacts were reviewed to determine if any feature of the project outcome would result in disproportionate effects toward any segment of the population. None were identified.

3. Results from the EJ analysis of existing conditions did not indicate any "disproportionately high or adverse" impacts from the proposed action upon minority or low-income populations if the project is completed as proposed. However, the potential for continued occasional disruption of community cohesion under the "no-action" alternative is an issue worth noting. If the project is not built (i.e., an action to upgrade of the existing levee system to a significantly higher level of risk reduction is not implemented), all of the potentially devastating and disruptive impacts on the people and businesses in these rural communities from major flood events would not be mitigated.

4. A discussion of EJ impacts for with-project conditions (i.e., with the implementation of alternative plans) is presented in Section 6 of the EIS. Environmental consequences and impacts are described according to the socioeconomic or biological resource for each of the final array alternatives—Alternative A (no action), Alternative B (the recommended levee alignment and upgrade of the NFL), Alternative B2 (NFS Optional Alignment), and Alternative C (the MRL cutoff plan which includes Alternative B).

EXECUTIVE ORDER 13045, "PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS"

5.121 Studies have concluded ". . . that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because children's neurological, immunological, digestive, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults; children's size and weight may diminish their protection from standard safety features; and children's behavior patterns may make them more susceptible to accidents because they are less able to protect themselves. Therefore, to the extent permitted by law and appropriate, and consistent with the agency's mission," by Executive Order 13045, "each Federal agency shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

5.122 The purpose of this section is to provide an objective analysis of environmental health and safety risks to children. "Environmental health and safety risks include risks to health or safety that are attributable to products or substances that the child is likely to come in contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)." Among the health and safety issues incurred by children during major storm and flood events are losses of life, separation from family members, unsanitary conditions, sickness and disease, lack of supplies, anxiety and confusion, the inability to care for themselves, lack of transportation, etc.

5.123 As previously discussed with EJ concerns, installation of the proposed project would provide a higher level of protection than currently exists in the project area. This higher level of protection will eliminate or significantly reduce many of the safety and health issues that have been incurred in the past without this additional level of levee protection. In addition, with the project in place, the levee will be reinforced to withstand maximum hydrologic conditions. Altogether, the improvements will work in conjunction to reduce the potential for overtopping, levee breaches, and rushing flows that can result in high-velocity catastrophic events.

5.124 In regard to Executive Order 13045, it has been determined that implementation of the proposed improvements would provide a higher level of protection than currently exists in the project area, thus providing a higher level of protection for all residents alike, including children. Thus, with the project in place, environmental conditions are expected to improve (i.e., susceptibility to illness, disease, anxiety, bodily harm, unsanitary conditions, inaccessibility, etc., should be greatly reduced.) In addition, no disproportionate adverse impacts toward children associated with potential safety and health risks during high-velocity storm and floodwater events in the project area have been identified, as compared to any other segment of the population.

6. ENVIRONMENTAL CONSEQUENCES

6.1 The basis of this Environmental Impact Statement (EIS) is to evaluate the potential impacts associated with the replacement or modification of the West Bank non-Federal levee system (NFL) in Plaquemines Parish, Louisiana, in accordance with the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality's (CEQ) Regulations (40 CFR §1500-1508), and the USACE Engineer Regulation (ER) 200-2-2, "Environmental Quality, Procedures for Implementing the NEPA."

6.2 Previously, the array of alternatives was identified and discussed in detail in Section 4 along with the rationale for their selection. Section 6 will assess and compare the beneficial and adverse environmental effects that are expected to occur with each alternative (i.e., Alternatives A, B, B2, and C). Alternative A is the no-action alternative; Alternative B, the recommended levee alignment to replace or modify the NFL; Alternative B2, the NFL alignment option; and Alternative C, the Mississippi River levee (MRL) mainline cutoff plan.

6.3 The project area is evaluated based on a comparison of the without- and with-project conditions. The without-project conditions, or existing conditions, which were described in Section 5, reflect the conditions expected to prevail in the absence of any alternative plan including replacement or modification of NFL. This is basically the same as the no-action plan. Thus, the existing conditions described in Section 5 represent the existing no-action setting. The with-project conditions presented in Section 6 reflect conditions in the area with alternative replacements or modifications in place. Thus, the no-action plan, as Alternative A, represents future without-project conditions, wherein no action is implemented.

OVERVIEW OF ALTERNATIVE AND POTENTIAL BORROW AREA IMPACTS

Do not worry about borrow

6.4 An overview of potential alignment impacts is discussed in the following paragraphs by specific project alternative for the with-project setting. Each of these represents one scenario for future with-project conditions in the project area. The environmental consequences of implementing each of the proposed alternatives are presented according to their potential impacts on various socioeconomic and biological resources. Where possible, quantitative impacts have been assessed. First, a brief recap of the alternative descriptions is presented.

6.5 As discussed in Sections 1 and 4, alternative methods of securing borrow have been utilized and found to be in the best interest of the Government, including preapproved Government-furnished borrow and preapproved contractor furnished borrow. A contract-by-contract borrow analysis will be completed at time of construction to determine the best alternative. The NEPA coordination for all potential borrow sources has been previously

documented under several Individual Environmental Reports (IER). Government-furnished borrow areas were coordinated with IERs 18, 22, 25, and 28 and IERs 19, 23, 26, 29, 30, 31, and 32 coordinated the preapproved contractor-furnished borrow areas. A transportation analysis of potential impacts is included later in Section 6 of this document. All borrow IERs are posted on www.nolaenvironmental.gov.

6.6 For analysis purposes, the findings of the IERs for the Government-furnished borrow areas are discussed in this section following levee alternative analysis. Prior to any borrow acquisition, the USACE will review the existing environmental documentation to ascertain if additional impact analysis or agency coordination will be necessary. If so, the USACE will produce an updated Environmental Assessment for that particular borrow area.

Recap of Alternatives

6.7 **Alternative A**. Alternative A, or no action, consists of retaining and maintaining the existing NFL in its present form. This alternative is not expected to have any direct, long-term adverse effects on existing resources in the project area. However, the No-Action Alternative would result in the continued risk of the NFL overtopping in high-water events such as hurricane storm surge. Potential impacts associated with specific socioeconomic or biological resources are discussed after this recap.

6.8 **Alternative B (Proposed Action)**. Alternative B, the proposed action alternative for the NFL, consists of recommended levee alignments to replace or modify the levee to reduce the risk associated with the 2 percent or 50-year level storm surge event. A 2 percent level of risk reduction (LORR) therefore becomes the design criteria for incorporating the NFL into the Federal levee system (including portions of the MRL). The existing levee elevation would increase by approximately 3 to 4 feet, National Geodetic Vertical Datum (NGVD), in the northern portion of the project area and approximately 8 feet, NGVD, in the southern portion. Implementation of the recommended levee alignments is not expected to have any direct, long-term adverse effects on existing resources in the project area. However, economic and biological resources adjacent to the proposed levee alignments may temporarily encounter some disruption or inconvenience during project construction as the levee is enlarged. Phased levee construction will be implemented to reduce the levee footprint width and would result in reduced potential impacts.

6.9 **Alternative B2 (NFS Optional Alignment)**. Alternative B2 is designed to modify the NFL to the 1 percent LORR in Section 1 (Oak Grove to La Reussite). The proposed levee height ranges from 3 to 3.5 feet higher than the Corps authorized levee grade. The current authorized levee height for the upper 2.5 miles of Section 1 is 7.5 feet, NGVD, and the remaining is 9.0 feet, NGVD. The total area of impact, including the levee, is 133 acres. With the B2 design, the authorized grade will be raised to 10.5 feet, NGVD, at the upper end and 12.5 feet, NGVD, at the lower end. The total impacted area of the B2, including the levee, will be 231 acres.

6.10 **Alternative C**. Alternative C is the MRL mainline cutoff plan. It is similar to the proposed Alternative B, except Sections 3 through 5 may not be constructed due to lack of available funds. In this case, Section 3, which is designed to the same height as Sections 1 and 2, will tie into the MRL at a proposed site estimated to be directly south of Citrus Lands (i.e., where the NFL and MRL are at the closest proximity).

PHYSIOGRAPHY AND GEOLOGY

Alternative A

6.11 The No-Action Alternative consists of retaining and maintaining the existing NFL in its present form. This alternative is not expected to have a direct, long-term adverse effect on physiography or geology in the project area. The No-Action Alternative would result in the continued risk of overtopping the NFL by hurricane storm surge.

Alternative B (Proposed Action)

6.12 Implementation of the recommended levee alignment is not expected to have a direct, long-term adverse effect on geology in the project area. Physiography of the area adjacent to the proposed levee alignment would change as the levee is replaced or modified. The physiography of the area outside the proposed levee alignment would be expected to remain as it is under the No-Action Alternative.

Alternative B2 (NFS Optional Alignment)

6.13 The impacts of this alternative would be similar to those of Alternative B with the exception of greater NFL levee heights in Section 1, Oak Grove to La Reussite, which reflects the LPP design of 100-year LORR. This increase in levee height would also be permanent as long as the levee is Federally authorized.

Alternative C

6.14 The impacts of implementing this alternative would be similar to those of Alternatives B for Sections 1 and 2. Section 3 of this alternative is designed to the same height, but would tie into the MRL levee directly south of Citrus Lands.

TOPOGRAPHY

Alternative A

6.15 This alternative is not expected to have a direct, long-term adverse effect on topography in the project area.

Alternative B (Proposed Action)

6.16 Implementation of the recommended levee alignment would have a direct, long-term effect on topography within the levee alignment. Land within the footprint of the levee would be filled with borrow material to raise the elevation of levee. The existing levee elevation would increase by approximately 3 to 4 feet in the northern portion of the project area to 8 feet in the southern portion.

Alternative B2 (NFS Optional Alignment)

6.17 The impacts of this alternative would be similar to those in Alternative B with the exception of greater levee heights in Section 1 to reflect the LPP design of 100-year LORR. This increase in levee height would also be permanent as long as the levee is a Federally authorized project.

Alternative C

6.18 The impacts of this alternative would be similar to those in Alternative B with the exception of portions of the levee, depending on available funding, that may not be constructed. In that case, a tie-in to the Mississippi River levees (MRL) would be necessary at the proposed location directly south of Citrus Lands where the NFL and MRL are in closest proximity.

SOCIOECONOMICS

6.19 The focus of the socioeconomics discussion is to describe in general terms the environmental consequences of project implementation on the existing and future social and economic resources along the existing levee alignment. They will be discussed based on their potential impact on the proposed project area by each final array alternative (i.e., Alternatives A, B, B2, and C) as it relates to flood risk and hurricane risk reduction along the existing levee alignment and Louisiana Highway 23 (LA-23), in accordance with the New Orleans to Venice Project (NOV) as authorized by Congress.

6.20 The benefits of improving surge and flood risk may include inundation reduction benefits, evacuation benefits; reduction in the emergency costs of state and local governments (such as sandbagging and police overtime), repairs to public property (such as roads and bridges), overtime for sanitation department employees, reductions in the cost of providing subsistence and lodging for residents whose homes are potentially uninhabitable due to storm damages, reductions in reoccupation costs required by homeowners in order to move back into their homes, and reductions to costs to business and industrial cleanup and restoration costs required by business owners in order to make their businesses operational once again.

6.21 Although considered part of the New Orleans-Metairie-Kenner Metropolitan Statistical Area (MSA), this relatively narrow strip of protected land is largely rural, used for agricultural production such as pasture, raising cattle, and citrus groves. However, other important natural resources within the immediate vicinity include waterborne commerce along the Mississippi

River and Port of Plaquemines; a section of the Mississippi River and Tributaries (MR&T) levee system that extends as far north as Missouri and as far south as the Gulf of Mexico; the production, refining, and/or transport of crude petroleum, natural gas, coal, and other important natural resources, and commercial fisheries.

Population and Housing

Existing Conditions

6.22 Table 6-1 compares 2000 population and housing of each of the five sections in the project area according to their location east and west of LA-23. As shown, most of the residential development within the existing back levees from Oakville to St. Jude was located in Section 1 in 2000, prior to the recent hurricanes. More than 80 percent of the population and more than 75 percent of the housing units in the project area were located in this area. A recent study conducted by Louisiana Speaks, an organization endorsed by the State's Louisiana Recovery Authority, indicated that Reach 1 includes an estimated 1,110 acres of residential land while most of the residential development in Reaches 2 through 5 was rural or small communities between LA-23 and the MRL system.

TABLE 6-1
POPULATION AND HOUSING BY SECTIONS OR REACH
(CENSUS TRACT 504 AND PLAQUEMINES PARISH)

Population and Housing by Reach (No.)						
East of LA-23			West of LA-23		Total Area	
Areas	Population	Housing Units	Population	Housing Units	Population	Housing Units
Section 1	805	297	1,441	479	2,246	776
Section 2	187	64	24	8	211	72
Section 3	5	6	2	7	7	13
Section 4	95	44	5	32	100	76
Section 5	6	3	0	0	6	3
Total Project Area	1,098	414	1,472	526	2,570	940

SOURCE: U.S. Census Bureau, American FactFinder, File 1, 2000 report. Percentages (%) based on U.S. Army Corps of Engineers, New Orleans District, estimates using 2000 census data.
N/A - not applicable since units are vacant or beyond census block boundaries.

Alternative A

6.23 Under future without-project conditions, private as well as public, local, or state authorities may maintain flood and hurricane risk reduction of existing and future housing units occupied in the study area subject to displacements. If existing levees are maintained at insufficient levels and if adjacent wetlands continue to subside as in the past several decades, the

threat of floods and hurricanes may increase including damage to residential structures and displacement of population. Most of the occupied housing and population within the project area is located in Section 1, extending from Oakville to La Reussite. Unless private, local, or state authorities enhance flood and hurricane risk reduction, substantial population and housing expansion in Sections 2 through 5 appear unlikely without an extensive commitment of resources.

Alternatives B (Proposed Action) and B2 (NFS Optional Alignment)

6.24 The construction of Alternative B or B2 would provide additional risk reduction against the floods and hurricanes that periodically threaten the region, including the close proximity of the New Orleans urbanized area and adjacent coastal areas. Rather than displacement, the proposed risk reduction may encourage development as it has occurred in other areas of the larger metropolitan area. However, as described in the purpose and need of this document, plans for this project originated from Hurricanes Katrina and Rita and the need for emergency protection rather than Federal endorsement of future development within areas unusually sensitive to flood and hurricane conditions. All the proposed replacements or modifications could encourage housing development and population growth in more protected areas within the project area. Based on historical trends in Section 1, housing demand generally develops along a major transportation artery (e.g., LA-23, also used as a primary evacuation route). However, a variety of other factors may also influence the demand for future housing, including population density, access to recreation facilities, and other considerations. Because of the control maintained by local governments relative to zoning and the speculative nature of development, "induced development" of the area is not considered an indirect impact of project construction. The proposed project alternatives are not designed to reduce the risk for major hurricane surge at the 1 percent occurrence interval except for levees included in Alternative B2 that the local sponsor wishes raised to the 1 percent LORR. It should be noted that lands adjacent to the levees identified in Alternative B2 are still at risk from storm surge at the 1 percent LORR from the west, potentially resulting in damage to residential property and population displacement.

Alternative C

6.25 The conditions resulting from construction of Alternative C would be similar to Alternatives B and B2 with the exception of the LORR being unaltered along the levee segments south of the MRL tie-in. Sections to the south may increase very slowly as the national population increases; however, they also may decline or fluctuate as subsidence continues and periodic hurricanes pass through the area.

Impacts to Employment,
Businesses, and Industrial Activity

6.26 Businesses, industries, and agricultural developments located within the project area generate employment through port facilities along the Mississippi River (see the Port of Plaquemines), an oil refinery (Conoco-Phillips), a grain elevator, coal deliveries, pasture and livestock production, and scattered citrus groves south of the oil refinery. The Union-Pacific Railroad operates a freight line that parallels LA-23 to a point near the oil refinery and connects with trucking lines. Several small marinas are immediately adjacent to the existing back levees used by commercial fishermen. Expansion of economic development has been limited in part due to the narrow strip of protected land available and periodically threatened by hurricanes. Repopulation activity following Hurricanes Katrina and Rita may still be in transition influencing businesses and industry that were operational prior to Katrina, including the economic development of port activities; commercial and recreational fisheries; the production, processing, and transport of oil and gas resources, and the availability of water.

6.27 Recent studies indicate that of the 132 refineries in the Nation, the Conoco-Phillips Alliance refinery ranks as the 18th largest. The Conoco-Phillips Alliance refinery, between Oakville and St. Jude, carries a processing capacity of approximately 250,000 barrels a day. This refinery accounts for approximately 1.5 percent of total U.S. refining capacity. Its major products are gasoline, diesel fuel, jet fuel, and home heating oil. Much of the output from this plant is delivered to the eastern seaboard states via pipeline. Due to Hurricanes Katrina and Rita, it is estimated that the Alliance refinery lost approximately 58 percent of its annual production. An estimate of the value of Alliance's annual output, based upon its capacity, using a typical barrel yield of refined product at 2006 prices, without taxes, is approximately $8.5 billion. According to the Louisiana Manufacturers Register in 2006, total employment at the refinery was approximately 370.

6.28 Developers have expressed an interest in the construction of a "millennium" port, possibly in the vicinity of the Oakville- St. Jude area although a schedule for construction is not currently available.

6.29 **Alternative A**. Under without-project conditions, private, local, or state authorities would probably maintain flood and hurricane protection to current levels in support of existing and future small businesses and scattered pasture influencing limited employment between Oakville to La Reussite. As in the case of the displacement of people and housing, continued subsidence and land loss over the past several decades have added to the threat of hurricane surges and related flooding and may increase the threat of damage to businesses and related employment in the area of Section 1 if existing levees are maintained at current elevations. Undeveloped land areas of Section 1 may become less desirable for urban purposes without additional hurricane protection. As previously indicated, business and industries generating employment in the vicinity of Section 1 include agriculture and a few local businesses as well as port facilities immediately along the Mississippi River and levee system. Sections 2 through 5 are likely to

continue as long as available natural resources are available with sufficient flood and hurricane risk reduction. However, conditions could also decline, or fluctuate, as subsidence continues and periodic hurricanes occur in the area. Economic development in Sections 2 through 5 (e.g., the Conoco-Phillips oil refinery, coal facilities, CHS grain elevators, sections of Port of Plaquemines, agricultural developments, etc.) may eventually require relocation of these businesses and local employment. Much of the land is agricultural land including tracts of subsided wetlands.

6.30 **Alternatives B and B2**. Construction of Alternative B or B2 would provide additional risk reduction from hurricane storm surge that currently threatens businesses, industries, agricultural development, and related employment within Section 1. Much of the waterborne commerce that would otherwise pass through the project area would move to ports of refuge prior to severe hurricanes as in the past. While the damage from severe winds may continue, structurally sound back levees would help to reduce the effects of tidal surges created by hurricanes.

6.31 Emergency planning and funding considerations in this study have not included quantitative benefit-cost analyses and related impacts on future development; however, it recognizes that a substantial enhancement to flood and hurricane risk reduction provided by a 12-foot levee or seawall could influence economic development within the area protected. Sections 2 through 5 would tend to encourage greater economic stability and potential for business and industrial growth as well as residential expansion.

6.32 As previously indicated, most of the existing economic development is currently between LA-23 and the Mississippi River while most of the economic development west of LA-23 is used for agricultural development. With increased hurricane and flood risk reduction, the potential for businesses, industrial activity, and related employment conditions may increase. Local officials have expressed support for a system (Alternative B2) that would maximize the land areas with an elevation of 12 feet, NGVD, along the existing NFL. Emergency planning and funding considerations have not included quantitative benefit-cost analyses and impacts on future development, but recognize that conditions are likely to occur.

6.33 **Alternative C**. The conditions resulting from construction of Alternative C would be similar to Alternatives B and B2 with the exception of the LORR being unaltered along the levee segments south of the MRL tie-in.

Availability of Public Facilities and Services

6.34 The relatively low population density of the project area tends to limit the demand for certain public facilities such as public schools and hospitals or services such as police and fire protection. Other services include water and sewerage treatment services; telecommunication operations; and power supplies for industrial, commercial, and residential purposes. In the past, local and state authorities and private developers have provided protection to the back levees of the area against floods and hurricanes. Since Hurricanes Katrina and Rita, more Federal assistance has been authorized for protection against such storm damages.

6.35 Two public facilities immediately within the project area include the Louisiana State University AgCenter Coastal Area Research Station near Port Sulfur (Section 4) and the Plaquemines Parish Sheriff's Office Shooting Range in the Myrtle Grove area (Section 3). Another important public facility providing services immediately adjacent to the project area is the MRL system providing more than a 230-mile deep-draft channel from the Port of Baton Rouge to Head of Passes.

6.36 **Alternative A**. Under without-project conditions, certain public facilities and services within the project area would continue to be subject to damages from severe floods and hurricanes. The environmental conditions that would tend to limit the current LORR in the future may also threaten existing protection levels of public facilities and services. Under the No-Action Alternative, no replacements or modifications to hurricane protection and LA-23 would be implemented.

6.37 **Alternatives B (Proposed Action) and B2 (NFS Optional Alignment)**. Construction of Alternative B or B2 from Oakville to St. Jude would represent an extension of public facilities and services to maintain flood control and hurricane risk reduction within the local community. If construction of the project led to greater economic development within the area, the demand for public facilities and service may increase as well.

6.38 **Alternative C**. The consequences of implementing this alternative would be similar to those of Alternatives B and B2, with the exception of the tie-in portion to the MRL which would leave the southern sections in present condition.

Disruption of Desirable Community and Regional Growth

6.39 Desirable community and regional growth with respect to the proposed hurricane risk reduction project is considered growth that responds to the needs of the local communities and region and is consistent with National Economic Development (NED) guidelines.

6.40 **Alternative A**. Without the proposed Federal actions, disruption of desirable community and regional growth would leave funding and decisions regarding hurricane and flood risk management to the local and state residents and others with economic interests.

6.41 **Alternatives B (Proposed Action), B2, and C**. All the project alternatives may produce a temporary disruption, and in some cases may require mitigation to restore desirable community and regional growth as in the case of many other Civil Works projects. Project alternatives that would generally extend well beyond currently occupied housing units would have little adverse impact on community or regional growth. The completion of the project would add flood and hurricane risk reduction generally needed for community and regional growth. As currently planned, maintenance of the project would depend upon local or state authorities.

Impacts to Property Values and Tax Revenues

6.42 Property values and tax revenues within the project area and much of Plaquemines Parish have somewhat unique characteristics. The Parish has the limited availability of protected land along one of the world's most important waterways with large quantities of oil and gas nearby as well as large quantities of commercial fisheries, contributing to property values. On the other hand, the area is susceptible to severe weather conditions and high river stages, threatening property damages and limiting the tax base required for urban expansion. Such factors, as increasing subsidence rates over the past century, can influence property values and subsequently tax revenues.

6.43 **Alternative A**. If no additional risk reduction is implemented, marginally protected areas would experience declines in property values and consequently related taxes may decline as well. Properties within the project area less affected by future flooding or hurricane damage may tend to increase in value due to the limited availability of property along the deep-draft channel of the waterway.

6.44 **Alternatives B (Proposed Action), B2, and C.** The increased risk reduction would help maintain property values and consequently help sustain the existing tax base of communities within the project area and regions influenced by economic developments beyond the immediate project area. Much of the New Orleans metropolitan area economic development occurred through a system of levees and seawalls similar to the proposed 12-foot alternatives considered. Although the benefits of each alternative would vary, all of the alternatives would enhance storm security.

6.45 In general, property currently used for urban and industrial purposes has a higher value than agricultural land. Alternatives that extend significantly beyond LA-23 include larger tracts of wetland and may have less potential for future urban purposes and therefore may be of less economic value. Sections 1 and 2 are in close proximity to the New Orleans urbanized area, increasing the potential for conversion from undeveloped land to a higher usage and values.

6.46 The threat of land loss and subsidence over time may require additional maintenance to sustain property values due to the nature of hurricanes that periodically pass through the area. If economic development and property values increase from a project alternative, reductions in storm damages could also add stability to the local tax base.

Noise Effects

No Action

6.47 Without implementing a construction action, noise within the project area would remain unchanged from current conditions where the largest source of noise is vehicle traffic and industrial activity along LA-23 which parallels the NFL. The area would receive indirect noise impacts in the event of significant hurricane flooding. In this instance, the noise levels for the area would be elevated from the heavy equipment used for cleanup and reconstruction after floodwaters had receded. There would be no cumulative effects associated with noise from selecting the no-action alternative.

Alternative B (Proposed Action),
B2 (NFS Optional Alignment), and C

6.48 The NFL study area is largely rural, but in limited areas, is adjacent to residential or commercial, and recreational locations with varying degrees of associated noise. Changes in noise levels are typically measured and reported in units of dBA, a weighted measure of sound level. The U.S. Federal Transit Administration (FTA) has established noise impact criteria. The FTA Noise Impact Criteria groups noise-sensitive land uses into the following three categories: Category 1- Buildings or parks where quiet is an essential element of their purpose; Category 2 - Residences and buildings where people normally sleep; and Category 3 - Institutional buildings with primarily daytime and evening use. Institutional recognition of noise is provided by the regulations for Occupational Noise Exposure (29 CFR Part 1910.95) under the Occupational Safety and Health Act of 1970, as amended. This section mandates that noise levels emitted from construction equipment be below 90 dBA for exposures of 8 hours per day or more. The primary sources of noise (typically between 50 and 60 dBA at 100 feet) within the project area include everyday vehicular traffic along LA-23 which parallels the NFL and maintenance of roadways, bridges, and other structures (typically between 80 and 100 dBA at 50 feet). The upper limit for unprotected hearing exposure established by the Occupational Safety and Health Administration (OSHA) is 115 dBA.

6.49 Implementation of construction activities would cause noise to be emitted from various construction equipment sources. Under all of the construction scenarios for the NFL, noise would be created from high-powered machinery and human activities within the project right-of-way and be emanated various distances beyond the construction site until the noise energy dissipated. Using data from the Federal Highway Administration (FHWA), Table 6-2 is a listing of noise-generating equipment typically used for construction of levees and the noise emanated at various distances beyond the construction site.

TABLE 6-2
FHWA NOISE LEVELS AT DISTANCE FROM THE SOURCE (DBA)

Noise Generator	50 Feet a/	100 Feet a/	200 Feet a/	500 Feet a/	1,000 Feet a/
Dump Truck	76	70	64	56	50
Backhoe	78	72	68	58	52
Front End Loader	79	73	67	59	53
Concrete Mixer	79	73	67	59	53
Crane	81	75	69	61	55
Bull Dozer	82	76	70	62	56
Auger Drill	84	78	72	64	58
Pile Driver	91	85	79	71	65

SOURCE: FHWA 2007. The dBA at 50 feet is measured; the others are model estimates.
a/ Distance from receptor.

6.50 As presented in Table 6-5, completing the project would result in over 136 million miles of road traveled to deliver over 2 million loads of borrow material. All major roads or interstates were assumed to be traveled with occasional local road from borrow sites being utilized. Sections 4 and 5, the southernmost two sections, will experience the majority of the sum of miles traveled, as well as number of truck loads. Sections 4 and 5 are largely rural in nature, and the increase in noise is not expected to be adverse.

6.51 The direct noise impacts to the project area would be localized and temporary and would likely be below the 115 dBA threshold established as the upper limit for unprotected hearing by the OSHA. While tolerance of unnatural disturbance varies among wildlife, the increase in noise levels during construction would likely result in various wildlife and fishery resources temporarily leaving or avoiding project area during construction activities. Any indirect impacts due to noise are expected to be localized, temporary, and minor in nature. There would be no cumulative effects from noise.

6.52 **Alternative A**. No adverse noise effects have been identified that would occur as a result of without project conditions. Ambient noise levels are likely to continue proportionate to community growth.

6.53 **Alternatives B (Proposed Action), B2, and C.** As in the case of the without-project considerations, no adverse impacts related to potential project replacements or modifications have been identified with respect to noise. During construction, noise levels may increase as in the case of other Civil Works projects, requiring appropriate methods of noise abatement.

Effects on Transportation

6.54 **Alternative A**. Under the No-Action Alternative, project conditions would remain similar to existing conditions (i.e., being subjected to damages from severe storms and hurricanes). Over time, subsidence and periodic severe storm events would likely result in substantial increases in the cost of protection to roads, bridges, and the existing rail spur. Repairs to LA-23 would continue with expected flooding.

6.55 **Alternatives B (Proposed Action) and B2 (NFS Optional Alignment)**. Increasing storm surge risk reduction from the existing level would enhance the current level of protection between Oakville to St. Jude and could lead to increased traffic along the highway, more commerce, enhanced evacuation, fewer repairs, and related impacts.

6.56 **Alternative C**. The consequences of implementing this alternative would be similar to those of Alternatives B and B2 with the exception that a portion of the lower segment of the levee alignment would not be upgraded. Existing transportation conditions would persist in that portion of the project area.

Transportation of Borrow

6.57 This section of the analysis focuses on the potential impacts from transporting borrow material to construction sites. 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." This detailed transportation study analyzed the impacts of transporting borrow material with truck, rail, and barges to construction sites. Due to time constraints, the analysis for this study was not as detailed as the New Orleans study; however, the numbers generated are accurate and will present any potential impacts from transporting material during the construction phase.

6.58 This section will analyze 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. The major assumption assumes that no material will be moved by any other transportation mode other than truck. The truck used for this study is a heavy duty diesel with a GVWR of 80,000 pounds providing the transporting capacity of 14.5 cubic yards (CY) of borrow material per load.

Material Delivery Assumptions

6.59 The primary objective in the transportation impact analysis were to determine the most logical path for transporting construction material from Government-approved borrow sites to the project area and assess the impact of this transportation.

6.60 The determination of the logical path required the locations of the borrow pits and location of access roads to the construction sites for delivery. The Geographic Information System software (ESRI ARC-MAP and Google Earth) was used to determine the mileage from borrow pits to the construction site. In this study, only major highways or interstates were used for delivery of borrow. This method might not be the best optimizer of total mileage, but it will reduce any potential road damage on lower weighted city streets or roads. Fortunately, the majority of all Government-approved borrow pits were adjacent or close to major roads. In this analysis, the large majority of roads used included Interstates 10 and 510, Highways 90 and 23, Belle Chasse Highway, and West Bank Expressway.

Projects and Quantities

6.61 This section provides quantity estimates of the proposed alternative for the material needed to replace or modify three sections of levee, approximately 34 miles, in Plaquemines Parish. The sections include NOV-NF-W-04(NFL-1), NOV-NF-W-05(NFL-2), and NOV-NF-W-06(NFL-3, NFL-4, and NFL-5). Table 6-3 depicts the Government borrow sites that may be used during the construction phase of the project.

TABLE 6-3
GOVERNMENT BORROW SITES
BY PARISH WITH ESTIMATED CUBIC YARD QUANTITIES

Site Name	Parish	Estimated Area Acres	Estimated Quantity (CY)
1418/1420 Bayou Road	St. Bernard	22	439,000
1572 Bayou Road	St. Bernard	10	164,000
4001 Florissant	St. Bernard	11	214,000
910 Bayou Road	St. Bernard	12	117,000
Dockville	St. Bernard	46	979,317
Belle Chasse NAS	Plaquemines	8	135,000
Brad Buras-West Bank	Plaquemines	8	163,000
West Bank North	Plaquemines	38	811,000
Tabony- East Bank	Plaquemines	99	1,600,000
Tac Carrere	Plaquemines	26	200,000
Bazile	Plaquemines	18	240,000
Bonnet Carre South 2	St. Charles	320	8,544,000
Bonnet Carre North 2	St. Charles	161	4,428,000
Bonnet Carre South 3	St. Charles	120	7,500,000
Cummings North	Orleans	149	4,000,000
Maynard	Orleans	44	493,020
Stumpf 1	Orleans	124	1,683,000
Stumpf 2	Orleans	100	2,558,000

TABLE 6-3 (Cont)

Site Name	Parish	Estimated Area Acres	Estimated Quantity (CY)
West Bank I	Jefferson	26	561,000
West Bank F	Jefferson	52	1,115,000
West Bank E -1	Jefferson	96	2,390,400
West Bank E- 2	Jefferson	62	1,543,800
West Bank D	Jefferson	27	629,000
Total		1,599	40,780,537

6.62 Table 6-3 displays an estimated 40 million CY of borrow is available for use. Table 6-4 depicts the required borrow for each section of the levee and the overall total of material required to complete this project.

TABLE 6-4
NON-FEDERAL LEVEE SECTIONS IN PLAQUEMINES PARISH
WITH THE REQUIRED QUANTITIES NEEDED FOR CONSTRUCTION

Levee Section	Quantity	Units
NOV-NF-W-04	2,600,000	CY
NOV-NF-W-05	11,360,000	CY
NOV-NF-W-06	15,088,000	CY
TOTAL	29,048,000	CY

6.63 As shown in the Table 6-4, levee section NOV-NF-W-06 will require the largest quantity of borrow material; subsequently, this is also the southernmost levee section. Access roads to the construction site NOV-NF-W-06 are 17.5 miles one way to Belle Chasse northbound on LA-23.

Methodology

6.64 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 Government-approved borrow sites to defined access roads for each section of the levee. Quantity of truck loads (CY) was calculated by the following equation:

Where:

V = Total truck loads required for each levee section
Q_4 = Particular section of levee (section W-04 in case)
TC = Cubic yard capacity per truck (14.5 CY)

6.65 This equation computes truck loads of material for each section of 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.

6.66 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 are listed below:

1. Type of truck used to transport material.

2. Miles traveled to construction site.

3. The rate which the truck would emit pollutants during the process.

6.67 MOBILE was used to generate emissions factors for volatile organic hydrocarbons (VOC), carbon monoxide (CO), oxides of nitrogen (NO_x), particulate matter (PM), sulfur dioxide (SO_2), ammonia (NH_3), and carbon dioxide (CO_2).

6.68 The current analysis compared to the CEMVN showed 10 percent reductions in the number of trucks loads (CY) of borrow that were required for completion of the project. Therefore, due to time constraints to produce this document, the values calculated for emissions is 90 percent of the values produced from the CEMVN study.

Results

6.69 Table 6-5 shows the total mileage, truck loads of borrow material needed, and the average round trip mileage for each section.

TABLE 6-5
TOTAL MILEAGE AND REQUIRED TRUCK LOADS
TO COMPLETE CONSTRUCTION OF THE
PLAQUEMINES PARISH NON-FEDERAL LEVEES

Levee Section	Quantity	Truck Loads	Mileage	Average Round Trip
NOV-NF-W-04	2,600,000	179,310	4,968,828	28
NOV-NF-W-05	11,360,000	783,448	50,632,874	65
NOV-NF-W-06	15,088,000	1,040,552	80,503,878	77
Totals	29,048,000	2,003,310	136,105,580	57

6.70 Referring to Table 6-5, completing the project would result in over 136 million miles of road traveled to deliver over 2 million loads of borrow material. All major roads or interstates were assumed to be traveled with occasional local road from borrow sites being utilized. Section 6 was responsible for the largest sum of miles traveled, as well as number of truck loads. This section was the southernmost portion of the project. On average, one round trip to deliver construction material was 57 miles. Other alternatives were analyzed to find an optimization rate for mileage, but the value presented was the best choice available.

6.71 It is generally accepted that forests play an important role in reducing carbon dioxide and the buildup of greenhouse gases. The planning for the proposed action minimized to the extent practicable the loss of forest cover. The principal means for mitigation would be through reforestation of cleared land which will produce significant rates of carbon sequestration until the reforested areas reach maturity, where upon sequestration rates would lessen. Table 6-6 gives the estimated emissions due to the construction of the levee system. These values were derived by taking 90 percent of the emissions values calculated by the CEMVN study. This is a good estimation based on the similarities of the two studies.

TABLE 6-6
DIESEL EMISSIONS (PER TON)

Miles (Millions)	Gallons of Diesel(millions)	VOCs	NO_x	CO_2	CO	$PM_{2.5}$	PM_{10}	SO_2	NH_3
136.1	21.1	69.1	1,254	236,825	334	25.1	27.3	2.25	3.96

6.72 **Construction Staging Areas and Access Roads**. Staging areas for the temporary storage of construction materials and access roads will be needed at various locations throughout the project area. The two main criteria for selecting staging and access route location where (1) the locations did not contain wetlands, as determined in the USACE/FWS land-use analysis and the USACE Regulatory Branch jurisdictional determination and (2) the selected sites were located within the cultural resources survey area and avoided impacts to cultural resources documented during the cultural resources survey. The results of the surveys were included in a report, "Cultural Resource Investigations for the Non-Federal Levees Project West Bank of the Mississippi River, Plaquemines Parish, 2009." Temporary staging areas were located in previously converted non wetland areas in close proximity to construction and access roads were located on existing parish transportation routes. The locations of these areas are depicted in Figure 4.1. If during construction it is determined that staging areas and access or haul roads will be situated outside the areas of analysis, then a supplemental environmental document will be necessary.

Changes in Community Cohesion

6.73 Community cohesion may be considered as the unifying force of a group due to one or more characteristics that provide commonality. These characteristics may include such commonality as race, education, income, ethnicity, religion, language, and mutual economic and social benefits. Community cohesion may be the force that keeps groups together long enough

to establish meaningful interactions, common institutions, and agreed ways of behavior. It is a dynamic process, changing as the physical and human environment changes. For example, changing a right-of-way may divide a community; it may cause the dislocation of a significant number of residents; or it may require the relocation of an important local institution, such as a church or community center. On the other hand, a Civil Works project for flood and hurricane risk reduction may create common bonds and enhance community cohesion.

6.74 **Alternative A**. Under the without-project alternatives, community cohesion may ultimately decline as the threat of periodic storm damages and displacement of residents to alternative communities occur.

6.75 **Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and C**. Increased flood and hurricane risk reduction would contribute to economic stability within the Oakville-St. Jude project area; help protect some of the homes previously subject to storm damage; and maintain the existing school, churches, and other institutions that all contribute to community cohesion.

SOILS

Alternative A

6.76 The No-Action Alternative consists of retaining and maintaining the existing NFL. This alternative is not expected to have a direct, long-term adverse effect on soils in the project area if the levee is maintained. However, allowing the levee to deteriorate could change the character of some wetland soils adjacent to the levee.

Alternative B (Proposed Action)

6.77 Implementation of the recommended levee alignment is expected to have a direct, long-term adverse effect on hydric soils along the proposed levee alignment. A change in the character of wetland soils would be expected where the levee width is expanded into adjacent wetlands in order to increase the levee height. These wetland soils would be permanently covered with borrow material and incorporated into the new levee.

Alternative B2 (NFS Optional Alignment)

6.78 The impacts of implementing this levee alignment would also be expected to have a direct, long-term adverse effect on hydric soils along the proposed levee alignment. A change in the character of wetland soils would be expected where the levee width is expanded into adjacent wetlands in order to increase the levee height. These wetland soils would be permanently covered with borrow material and incorporated into the new levee.

Alternative C

6.79 The expected impact of implementing this levee alignment would be similar to Alternative B and B2. However, the overall impact of implementation of this alignment would be less than Alternative B and B2 due to the reduced length of levee when incorporating the MRL tie-in.

PRIME AND UNIQUE FARMLAND

6.80 None of the NFL alternatives are expected to impact prime or unique farmland. Alternative B2 (NFS Optional), if implemented, will be constructed on land previously disturbed by road construction.

6.81 The staging areas/access routes, located to avoid wetland areas and cultural sites, may impact up to an estimated 20 acres of prime or unique farmland. A Farm Impact Rating Form (NRCS-CPA-106) was submitted to the Natural Resources Conservation Service (NRCS) for consideration. The NRCS responded by letter dated April 6, 2011 (Appendix D), and requires no further consultation regarding impacts to prime and unique farmland unless project design changes.

BIOLOGICAL RESOURCES

6.82 Biological communities found in or near the project area include farmland, pasture, bottom-land hardwoods, and wetlands. The most visible wetlands are emergent marshes which are comprised mainly of wetland vegetation rooted in seasonally or permanently flooded soils and vegetative parts of the plant which are above water. The biology of the area transitions from upland areas in the northern portion of the project area to more brackish marsh in the southern portion nearer the Gulf of Mexico.

HABITATS

Aquatic Habitat

6.83 **Alternative A**. There are no long-range plans by Plaquemines Parish Government (PPG) to replace or modify the NFL. Therefore, the continued existing use and maintenance of the NFL would not result in any temporary or permanent direct or indirect effects to aquatic habitat.

6.84 **Alternative B (Proposed Action).** Upgrading the NFL to the 2 percent LORR or authorized grade would require increasing the width and height of the levee. Increasing the width of the levee (land- and flood-side) would require filling aquatic habitat with borrow material. Aquatic species would be displaced or killed by this action. Expanding the base of the levee along the flood side into aquatic habitat would result in the permanent loss of aquatic habitat. Mobile species would be able to move into other adjacent aquatic habitat; however, sessile species would be killed. Indirect impacts to aquatic habitat would be minimal and consist mostly of increases to the discharges received as a result of steeper slopes.

6.85 **Alternative B2 (NFS Optional Alignment)**. The impacts of implementing this alternative are similar to those of Alternative B with the exception of the increased footprint in Section 1 to reflect the LPP designed to the 1 percent LORR. Indirect impacts would be similar to Alternative B.

6.86 **Alternative C**. The impacts of implementing this alternative are similar to those of Alternatives B and B2, but less in terms of the quantity of aquatic habitat impacted. Construction of the MRL tie-in would occur across agricultural land and would not impact aquatic species. Indirect impacts, while less due to a downsized project, would be similar to Alternative B.

Wetlands

6.87 Quantitative assessments of wetland value for existing conditions and project-related wetland impacts were determined using the Wetland Value Assessment (WVA) Methodology for Coastal Marsh Community Models (Roy, 2007) (Appendix E).

6.88 The WVA model is a quantitative, habitat-based assessment developed to estimate anticipated environmental impacts and benefits to wetlands. The WVA is a modification of the Habitat Evaluation Procedure (HEP) developed by FWS. The HEP is widely used by FWS and other Federal and state agencies in evaluating the impact of development projects on fish and wildlife resources. A notable difference exists between the two methodologies; however, in that HEP generally uses a species-oriented approach, whereas the WVA uses a community or habitat-level approach.

6.89 The WVA models operate under the assumption that optimal conditions for fish and wildlife habitat within a given coastal wetland type can be characterized, and that existing or predicted conditions can be compared to that optimum to provide an index of habitat quality. Habitat quality is estimated and expressed through the use of a mathematical model developed specifically for each wetland type. Each model consists of (1) a list of variables that are considered important in characterizing community-level fish and wildlife habitat values; (2) a Suitability Index graph for each variable which defines the assumed relationship between habitat quality (Suitability Index) and different variable values; and (3) a mathematical formula that combines the Suitability Indices for each variable into a single value for wetland habitat quality, termed the Habitat Suitability Index (HSI). The product of an HSI value and the acreage of available habitat for a given target year is known as the Habitat Unit (HU) and is the basic unit for measuring project effects on fish and wildlife habitat. The HUs are annualized over the project life to determine the Average Annual Habitat Units (AAHU) available for each habitat type. The change (increase or decrease) in AAHUs for each future with-project scenario, compared to future without-project conditions, provides a measure of anticipated impacts. A net gain in AAHUs indicates that the project is beneficial to the fish and wildlife community within that habitat type; a net loss of AAHUs indicates that the project would adversely impact fish and wildlife resources.

6.90 The WVA has become a standard tool for assessing wetlands values in Louisiana by Federal and state agencies, including not only coastal restoration projects, but also regulatory actions. The WVA model was used in this study to maintain consistency and enable comparisons to other studies. The WVAs were prepared in a collaborative effort by the USACE, FWS, National Marine Fisheries Service (NMFS), and Louisiana Department of Wildlife and Fisheries for all sites within the project area.

6.91 Details on the WVA assessments of each site, including assumptions and methodology, can be found in Appendix E. Table 6-7 displays the comparative impacts of each alternative and the resulting AAHUs loss.

Bottom-Land Hardwoods

6.92 The majority of bottom-land hardwood forests (dry and wet) are present in the northern portion of the project area.

1. **Alternative A**. Maintaining the NFL would not adversely directly impact the remaining bottom-land hardwood forests. Indirectly, at the present level of protection, hurricanes that impact the area could increase salt intrusion and prove detrimental to bottom-land hardwood species in the area.

2. **Alternative B (Proposed Action).** Enlarging the levee would result in the direct loss of 124.6 acres or 85.8 AAHUs of wet bottom-land hardwoods and 17.7 acres or 12.1 AAHUs of dry bottom-land hardwoods. Indirectly, the loss of bottom-land hardwoods would impact species associated with this resource negatively, but by modifying or replacing the levees reduced stormwater and attendant salinity could be considered beneficial..

3. **Alternative B2 (NFS Optional Alignment)**. Enlarging the levee would result in the direct loss of 146.0 acres or 100.9 AAHUs of wet bottom-land hardwoods and 20.4 acres or 13.8 AAHUs of dry bottom-land hardwoods. Indirectly, the loss of bottom-land hardwoods would impact species associated with this resource negatively, but by modifying or replacing the levees reduced stormwater and attendant salinity could be beneficial.

4. **Alternative C**. Enlarging the levee would result in the direct loss of 27.3 acres or 19.2 AAHUs of wet bottom-land hardwoods and 9.0 acres or 5.7 AAHUs of dry bottom-land hardwoods. Indirectly, the loss of bottom-land hardwoods would impact species associated with this resource negatively, but by modifying or replacing the levees reduced stormwater and attendant salinity could be beneficial.

TABLE 6-7
COMPARATIVE IMPACTS OF LEVEE ALTERNATIVES

Alignment Alternative	Bottom-land Hardwoods Wet		Bottom-land Hardwoods Dry		Wet Pasture		Swamp		Scrub-Shrub		Intermediate Marsh		Freshwater Marsh		Brackish Marsh		**Total All Habitats**	
Alternative A																		
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	**Acres**	**AAHUs**
Alternative A	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		**0.0**	
Alternative B																		
1.0	14.6	10.3	9.0	5.7	0.0	0.0	24.9	21.1	0.0	0.0	0.0	0.0	10.4	6.8	0.0	0.0	**58.8**	**44.0**
2.0	0.1	0.1	0.0	0.0	73.6	25.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**73.6**	**25.8**
3 & 4	40.3	26.5	8.2	6.1	73.4	24.9	0.0	0.0	1.4	0.0	0.1	0.0	0.0	0.0	10.8	6.2	**134.2**	**63.8**
5.0	69.5	48.9	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	2.7	**75.3**	**51.9**
Total	124.6	85.8	17.7	12.1	146.9	50.6	24.9	21.1	1.4	0.0	0.1	0.0	10.4	6.8	16.1	8.9	**342.0**	**185.4**
Alternative B2																		
1.0	36.1	25.4	11.7	7.4	0.0	0.0	67.6	57.4	0.0	0.0	0.0	0.0	27.2	17.8	0.0	0.0	**142.5**	**108.0**
2.0	0.1	0.1	0.0	0.0	73.6	25.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**73.6**	**25.8**
3 & 4	40.3	26.5	8.2	6.1	73.4	24.9	0.0	0.0	1.4	0.0	0.1	0.0	0.0	0.0	10.8	6.2	**134.2**	**63.8**
5.0	69.5	48.9	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	2.7	**75.3**	**51.9**
Total	146.0	100.9	20.4	13.8	146.9	50.6	67.6	57.4	1.4	0.0	0.1	0.0	27.2	17.8	16.1	8.9	**425.7**	**249.5**
Alternative C																		
1.0	14.6	10.3	9.0	5.7	0.0	0.0	24.9	21.1	0.0	0.0	0.0	0.0	10.4	6.8	0.0	0.0	**58.8**	**44.0**
2.0	0.1	0.1	0.0	0.0	73.6	25.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**73.6**	**25.8**
3.0	12.6	8.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	5.3	**21.6**	**14.1**
Total	27.3	19.2	9.0	5.7	73.6	25.7	24.9	21.1	0.0	0.0	0.0	0.0	10.4	6.8	9.0	5.3	**154.1**	**83.8**

Marsh

6.93 Freshwater, intermediate, and brackish marsh habitats would be impacted by each levee alternative, excluding Alternative A.

1. **Alternative A**. Maintaining the NFL would not adversely directly impact the remaining marsh habitat in the area.

2. **Alternative B (Proposed Action).** Enlarging the levee would result in the direct loss of 0 .1 acre of intermediate marsh, 10.4 acres of freshwater marsh, and 16.1 acres of brackish marsh, resulting in AAHU losses of 0.0, 6.8, and 8.9, respectively. Indirectly, species associated with this habitat would be adversely impacted.

3. **Alternative B2 (NFS Optional Alignment)**. Enlarging the levee would result in the direct loss of 0.1 acre intermediate marsh, 27.2 acres of freshwater marsh, and 16.1 acres of brackish marsh, resulting in AAHU losses of 0.0, 17.8, and 8.9, respectively. Indirect impacts would be similar to Alternative B.

4. **Alternative C**. Enlarging the levee would result in the direct loss of 10.4 acres of Intermediate marsh and 9.0 acres of brackish marsh, resulting in AAHU losses of 6.7 and 5.3, respectively. Indirect impacts would be similar to Alternatives B and B2.

Wet Pasture

6.94 Wet pasture areas are predominantly found along the levee alignments and are typically used for cattle grazing. If abandoned, these areas could subside and become freshwater marsh habitat.

1. **Alternative A**. Maintaining the NFL would not adversely impact the remaining wet pasture habitat in the area.

2. **Alternative B (Proposed Action).** Enlarging the levee would result in the direct loss of 146.9 acres or 50.6 AAHUs of wet pasture.

3. **Alternative B2 (NFS Optional Alignment)**. Enlarging the levee would result in the direct loss of 146.9 acres or 50.6 AAHUs of wet pasture.

4. **Alternative C**. Enlarging the levee would result in the direct loss of 73.6 acres or 25.7 AAHUs of wet pasture.

Scrub-Shrub

6.95 **Alternative A**. No impact.

6.96 **Alternatives B (Proposed Action), B2 and C**. Scrub-shrub areas are minimal along the levee alignments and typically consist of early succession willow and invasive Chinese tallow. Alternatives B, B2, and C comprise a total of 1.4 acres. These impacts will be combined with adjacent habitat impacts during mitigation analysis.

Terrestrial or Upland Habitat

6.97 The existing dry bottom-land hardwood is the only habitat considered terrestrial or upland and is found in altered hydrology areas on the protected side of the levees where drainage ditches have unnaturally lowered the water level in a historically wet bottom-land hardwood area.

1. **Alternative A**. Maintaining the NFL would not adversely directly impact the remaining dry bottom-land hardwood habitat in the area.

2. **Alternative B (Proposed Action).** Enlarging the levee would result in the direct loss of 17.7 acres or 12.1 AAHUs. Indirectly, species associated with this habitat would be adversely impacted.

3. **Alternative B2 (NFS Optional Alignment)**. Enlarging the levee would result in the direct loss of 20.4 acres or 13.8 AAHUs. Indirect impacts would be similar to Alternative B.

4. **Alternative C**. Enlarging the levee would result in the direct loss of 9.0 acres or 5.7 AAHUs. Indirect impacts would be similar to Alternatives B and B2.

Swamp

6.98 Swamp habitat, along the levee has a slightly increase water table and typical bottom-land hardwood species, but also includes more water tolerant species such as swamp tupelo (*Nyssa sylvatica)* and bald cypress (*Taxodium distichum*).

1. **Alternative A**. Maintaining the NFL would not adversely directly impact the remaining swamp habitat in the area.

2. **Alternative B (Proposed Action).** Implementation of this alternative would directly impact 24.9 acres or 21.1 AAHUs. Indirectly, species associated with this habitat would be adversely impacted.

3. **Alternative B2 (NFS Optional Alignment)**. Implementation of this alternative would directly impact 67.6 acres or 57.4 AAHUs. Indirect impacts would be similar to Alternative B.

4. **Alternative C**. Implementation of this alternative would directly impact 24.9 acres or 21.1 AAHUs. Indirect impacts would be similar to Alternatives B and B2.

Wildlife

Terrestrial Animals

6.99 **Alternatives A, B (Proposed Action), B2 (NFS Optional Alignment), and C**. It is doubtful the No-Action Alternative (Alternative A) or action alternatives B, B2, and C would have any effect on terrestrial animals. Wetland species, such as nutria, muskrat, waterfowl, etc., could easily avoid disturbances associated with construction activities. Birds, including migratory birds that might use adjacent marsh for resting, foraging, or loafing, would have ample alternative locations available for use. Upland species of mammals or reptiles that may inhabit the area are likely to react to disturbances by relocating to adjacent areas.

6.100 Construction activities will avoid adverse impacts to wading bird nesting colonies and bald eagle nesting locations through careful design of project features and timing of construction. A qualified biologist will inspect the proposed worksite 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).

6.101 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 will 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). Prior to the onset of construction activities, site visits will be conducted in cooperation with LDWF to determine the potential impacts to bird nesting colonies within the project area. If impacts to nesting colonies are anticipated during the listed nesting seasons, USACE and its contractors will, to the maximum extent practicable, attempt to restrict construction activities to nonnesting periods. However, due to the urgent nature of this project, unavoidable impacts to bird nesting colonies during the breeding season might be necessary. In the event this situation arises, USACE will contact LDWF to determine a course of action that will minimize negative impacts to bird nesting colonies.

Aquatic Animals

6.102 **Alternatives A, B (Proposed Action), B2 (NFS Optional Alignment), and C**. Alternative A would have no effect on aquatic animals. Alternatives B, B2, and C result in the loss of wetland habitat and associated faunal support functions such as nursery, feeding, breeding, and refuge.

Fisheries Resources

6.103 **Alternatives A, B (Proposed Action), B2 (NFS Optional Alignment), and C**. Alternative A would have no effect on fisheries resources. Expected impacts from these action alternatives would be similar. Expanding the flood-side base of the levee into aquatic habitat would result in the elimination of habitat supportive of estuarine fisheries species. Also, temporary displacement of estuarine organisms may occur during construction due to localized increases in turbidity.

Essential Fish Habitat

6.104 **Alternative A**. Under this alternative, there would be no change in elevation of existing flood risk reduction structures within Plaquemines Parish. The existing levees would not be enhanced structurally, and authorized design flood risk reduction would not be provided for these levee reaches. No further construction or modification to levees would occur within the NFL sections; thus, no Essential Fish Habitat (EFH) would be impacted.

6.105 **Alternative B (Proposed Action).** There are three main sources that would produce impacts to EFH: First, the expansion of the levee footprint into EFH areas would have permanent direct impacts on existing fresh, intermediate, and brackish marsh; submerged aquatic vegetation (SAV); mud, sand, and shell substrate; water bottoms; and estuarine water column. Deposition of fill material would displace or bury EFH areas or managed species; however, larger motile species could escape by avoiding disturbances. Additionally, indirect temporary construction impacts from stormwater runoff would potentially occur in various EFH within the construction access corridors or roads and at discharge pipes.

6.106 Temporary and moderate adverse impacts from turbidity would potentially occur during construction. The greatest effects would be to 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).

6.107 Temporary and moderate adverse impacts to the estuarine and marine water column would result from 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 material placement; however, larger motile species could escape by avoidance reactions to mechanical disturbances.

6.108 The expansion of the levee footprint would cause moderate permanent impacts to the EFH adjacent to a number of NFL sections. Anticipated adverse, long-term impacts on marsh and open water EFH resulting from the implementation of Alternative B includes approximately 0.1 acre of intermediate marsh, 10.4 acres of freshwater marsh, and 16.1 acres of brackish marsh. Approximately 26.5 acres of existing EFH marsh and open water bodies would be permanently impacted; however, the Corps has committed to creating approximately 58 acres of brackish and freshwater marsh. As a result of these actions, the Corps 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 B would have a moderate impact on EFH in the region.

6.109 **Alternative B2 (NFS Optional Alignment).** Alternative B2 would result in impacts to EFH similar to those described above for Alternative B. Temporary and moderate adverse impacts from turbidity would potentially occur during construction. The greatest effects would be to 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).

6.110 Temporary and moderate adverse impacts to the estuarine and marine water column would result from the dredging and disposal activities. It is possible that some Federally managed species in postlarval 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.

6.111 The expansion of the levee footprint would cause moderate permanent impacts to the EFH adjacent to a number of NFL sections. Anticipated adverse, long-term impacts on marsh and open water EFH resulting from the implementation of Alternative B2 includes approximately 0.1 acre of intermediate marsh, 27.2 acres of freshwater marsh, and 16.1 acres of brackish marsh. Approximately 43.4 acres of existing EFH marsh and open water bodies would be permanently impacted; however, the Corps has committed to creating approximately 99 acres of brackish and freshwater marsh. As a result of these actions, the Corps 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 B2 would have a moderate impact on EFH in the region.

6.112 **Alternative C**. The impacts of implementing this alternative are similar to those of Alternatives B and B2, but less in terms of the quantity of habitat impacted. Construction of the MRL Citrus Lands tie-in would occur across agricultural land and would not impact aquatic species. Anticipated adverse, long-term impacts on marsh and open water EFH resulting from the implementation of Alternative C includes approximately 10.4 acres of freshwater marsh, and 9.0 acres of brackish marsh. Approximately 19.4 acres of existing EFH marsh and open water bodies would be permanently impacted; however, the Corps has committed to creating

approximately 44 acres of brackish and freshwater marsh. As a result of these actions, the Corps 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 C would have a moderate impact on EFH in the region.

Threatened and Endangered Species

6.113 **Alternatives A, B (Proposed Action), B2 (NFS Optional Alignment), and C**. There are no Federally listed species that occur within the project area. While the bald eagle is not threatened or endangered, it continues to be protected under the Bald and Golden Eagle Protection Act and by the Migratory Bird Treaty Act. Three bald eagle nests exist in close proximity to the project area; all three were active in 2008 (FWS, 2009). To minimize any adverse impacts to the bald eagle, the FWS National Bald Eagle Management Guidelines would be observed. Those guidelines recommend (1) maintaining a specified distance between the activity and the nest (buffer area); (2) maintaining natural areas (preferably forested) between the activity and nest trees (landscape buffers); and (3) avoiding certain activities during the breeding season. Specifically, construction activity is prohibited within 660 feet of an active nest during the nesting season (1 May - 15 October); work cannot damage any part of a nesting tree; and no tree clearing should occur within 330 feet of a nest tree.

6.114 If a bald eagle nest is discovered within or adjacent to the proposed project area, then an evaluation will be performed by the interagency PDT to determine whether the project is likely to disturb nesting bald eagles. That evaluation will be conducted online at http://www.fws.gov/southeastleslbaldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary, and those results will be forwarded to the appropriate FWS office.

National and State Wildlife Refuges

6.115 There are no National Wildlife Refuges or State Wildlife Management Areas within the project area.

Marsh Restoration Projects

6.116 The Delta Building Diversion at Myrtle Grove located at Mile 59 above Head of Passes on the west bank of the Mississippi River at the town of Myrtle Grove, Louisiana, is a freshwater diversion project designed to restore wetlands outside Sections 2 and 3 and upper Section 4 of the NFL where they are being lost due to subsidence and saltwater intrusion. Potential project features include gated box culverts on the west bank of the Mississippi River and dredging of sediments from the Mississippi River for marsh creation in the project area. The project is currently in the planning stage with no tentative construction schedule. The USACE is the Federal sponsor with LDNR being the local sponsor.

Water Quality

6.117. **Alternative A**. The existing water quality in the proposed project area would not be impacted by this action.

6.118 **Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and C**. Construction of the NFL and associated features may have some localized short-term direct impacts on water quality. Construction activities may result in direct impacts to water quality of increased suspended solids in the vicinity of the construction due to site disturbance. The State of Louisiana allows a 10 percent increase to the 50 NTU criteria for turbidity in estuaries from discharges. It is not expected that the proposed action would exceed this limit. The increased suspended solids may result in decreased primary productivity due to shading of phytoplankton. The decreased primary productivity may then indirectly lower dissolved oxygen levels. These impacts would be short term and localized to construction site and immediate area.

6.119 Best management practices (BMP) such as silt fences, vegetated buffers, and hay bales would be used to reduce suspended solids from runoff. Turbidity screens or silt curtains will be placed in water around construction sites and will reduce the spread of waters with elevated concentrations of suspended solids. Culverts will be installed and maintained when building temporary or permanent roads through wetland areas. Actions to reduce long-term erosion and runoff include the revegetation of slopes with nonwoody stemmed and drought-resistant vegetation along the levee crowns and upper slopes to reduce erosion. Stabilization practices, such as fertilization, seeding, and mulching, shall be initiated at disturbed sites within 14 days of the cessation of construction if further construction activities at that site will not resume within 21 days.

State Water Quality Standards and Section 404 (b)(1) Guidelines

6.120 Under provisions of the Clean Water Act (33 U.S.C. §1251) of 1972, any project that involves the placement of dredge or fill material in waters of the United States or wetlands or mechanized clearing of wetlands would require water quality certification from the Louisiana Department of Environmental Quality (LDEQ), Office of Environmental Services. An application for water quality certification describing the impacts of the proposed action to water quality as described in Appendix F (Section 404(b)(1) Evaluation), along with a copy of this Draft Environmental Impact Statement (DEIS), will be provided to the LDEQ.

HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE (HTRW)

Alternative A

6.121 The No-Action Alternative is not anticipated to affect or contribute to HTRW in the project area under existing conditions. Indirectly, a major flood event which exceeds current NFL protection limits could contribute to dispersion of HTRW materials.

Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and C

6.122 The project would not result in any direct adverse effects associated with HTRW. Indirectly, a storm event which exceeds the proposed 2 percent level of protection for the project area could contribute to dispersion of HTRW materials that could be washed in from outside the project area.

6.123 USACE is obligated under ER 1165-2-132 to assume responsibility for the reasonable identification and evaluation of all HTRW contamination within the vicinity of the proposed actions. ER 1165-2-132 identifies the HTRW policy to avoid the 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) will be treated as project costs if the requirement is the result of a validly promulgated Federal, state, or local regulation. An ASTM E 1527-05 Phase I Environmental Site Assessment (ESA) was completed for each proposed levee alignment. The Phase I ESA documented the Recognized Environmental Conditions (REC) for each proposed area. If a REC cannot be avoided, due to construction requirements, the Corps may further investigate the REC to confirm the presence or absence of contaminants and recommend actions to avoid possible contaminants. Federal, state, or local coordination may be required. Because the Corps plans to avoid all identified RECs, the probability is low for encountering HTRW in the project areas.

AIR QUALITY

Alternative A

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

Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and C

6.125 Plaquemines Parish is classified as attainment for all of the National Ambient Air Quality Standards (NAAQS) (EPA, 2009). The attainment status for the parish is the result of area-wide air quality modeling studies. Thus, no Conformity Determination or other effort is required of the proposed action.

6.126 Therefore, there would be no overall adverse effects of the project on regional air quality that would result in nonattainment status. Direct impacts would occur from stockpiling and moving borrow material would have a potential for wind erosion and would create dust, especially as it is manipulated with heavy equipment. Wind erosion would be minimized by

revegetation of construction sites and other control measures. Best management practices will be implemented to minimize impact of air pollutants. Also, construction and waste disposal activities will be conducted in accordance with applicable local, state, and Federal statutes and regulations.

6.127 Indirect impacts to air quality would relate to the operation of heavy equipment in the reconstruction of the NFL producing localized and short-term engine emissions and dust. As presented in Table 6-5, completing the project would result in over 136 million miles of road traveled to deliver over 2 million truck loads of borrow material. However, impacts on regional air quality would be negligible.

EXECUTIVE ORDER 13514, "FEDERAL LEADERSHIP IN ENVIRONMENTAL, ENERGY, AND ECONOMIC PERFORMANCE"

6.128 Gases that trap heat in the atmosphere are called greenhouse gases. Added gases, primarily from burning fossil fuels such as coal, natural gas, oil, and gasoline, to power cars and factories enhance the natural greenhouse effect and likely contribute to an increase in global average temperature and related climate changes. Executive Order 13514 was signed by the President on October 5, 2009. The goal of the Order is "to establish an integrated strategy towards sustainability in the Federal government and to make reduction of greenhouse gas emissions (GHG) a priority for Federal agencies." The Order directs Federal agencies to lead by example in clean energy and to meet a range of energy, water, pollution, and waste reduction targets.

6.129 As noted in the Air Quality Impacts Section of this document, direct impacts would occur from stockpiling and moving borrow material. This impact would be short term and result in significantly less than direct emissions of 25,000 metric tons of CO_2-equivalent GHG emissions. The proposed project's construction would cause short-term indirect impacts to air quality due to the operation of heavy equipment. Impacts on regional air quality would be negligible.

RECREATION

Alternative A

6.130 Selection of the No-Action Alternative would result in no change to recreation in the region.

Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and C

6.131 Recreational activities, such as fishing, may be impacted directly by project construction in the vicinity of the activity. The recreational environment in and around the project area would experience limited short-term disruption imposed by construction activities and by the physical

size and working activities of the construction equipment. Indirectly, commercial entities which support the activities would be impacted. The impacts would be temporary and minor since persons desiring to participate in a particular activity could relocate to another area not under construction while still purchasing needed supplies.

CULTURAL RESOURCES

6.132 Cultural resources reconnaissance for this project area was conducted by New South Associates and URS under contract with the Corps, between August 12, 2008, and September 15, 2009. The results were included in a report, "Cultural Resource Investigations for the Non-Federal Levees Project West Bank of the Mississippi River, Plaquemines Parish, 2009." These investigations involved a Phase I archeological survey of proposed alignments, Phase II evaluative testing at several deserving sites located during the Phase I study, and topographic mapping of the Becnel-Perez Mound site (Site 16PL186), also located during the Phase I investigation. The survey covered approximately 157 miles (253 kilometers) of proposed levee alignments (alignments prior to recent authority guidance limiting the project to replacement or modification of existing levees), representing 3,574 acres (1,446 hectares) of survey area.

6.133 The cultural resources survey identified 19 new archeological sites, 8 artifact occurrences, and 2 historic standing structures in the area of potential effect. Two previously recorded sites were also revisited. Of these sites and occurrences, the majority were easily defined as nonsignificant resources that do not require further study for National Register of Historic Places (NRHP) considerations. Site 16PL186 is a prehistoric earthen mound complex and is considered to be eligible for the NRHP. Total station mapping of this area was undertaken site limits could be defined and so that shovel test delineations could purposefully be directed from outside site limits to cause no disturbance to potentially significant remains. The Becnel-Perez Mound (Site 16PL186) is an expansive prehistoric multimound site occupied from the Late Marksville through to the Mississippian/Plaquemine Period (100 B.C. - A.D. 1540), but was most active during the Coles Creek Period (A.D. 700 - 1200). The site was comprised of 14 mounds organized into 3 mound groups. The USACE has determined that site 16PL186 is eligible to be listed in the NRHP under Criteria C and D. Because Site 16PL186 appears to display integrity of location, design, setting, and association and seems to embody the typical techniques and spatial patterning associated with the construction of Coles Creek Period mound complexes, it is recommended eligible for NRHP under Criterion C. As the largest Coles Creek mound site currently known in Plaquemines and Jefferson Parishes, Site 16PL186 is also likely to yield information that would enlighten our understanding of adaptation, subsistence, and sociopolitical organization during the Coles Creek Period in coastal southeastern Louisiana; therefore, Site 16PL186 is also recommended as eligible for listing in the NRHP under Criterion D. Because of the recognized significance of this site, it will be completely avoided by project activities.

6.134 Five other cultural resources were discovered or revisited. These are all remains of historic brick structures related to drainage and crop manipulation. Previously recorded Site 16PL153 has been mapped and studied by various levee and borrow investigations in recent years, but it has never yet received adequate Phase II archeological testing to conclusively determine its potential NRHP significance. Similarly, Sites 16PL188, 16PL189, and 16PL190 were found to contain architectural remains that deserve further investigation if they are to be affected by construction, so as to definitely determine their NRHP significance. Site 16PL165 similarly has not received Phase II testing that would definitively determine its NRHP significance. All these cultural resources are suspected to lack National Register significance, but USACE will avoid them and leave them undisturbed for any further research potential.

Alternative A

6.135 The No-Action Alterative would not result in any impacts to historic properties. However, without a replaced or modified NFL system, the identified historic properties would be in greater risk of damage from a storm event.

Alternatives B (Proposed Action) and B2 (NFS Optional Alignment)

6.136 The cultural resources survey encompassed the project areas for both Alternatives B and B2, and construction of either alternative will completely avoid any impacts to identified historic properties. The USACE has concluded that project activities will cause "no adverse effect" to historic properties (i.e., cultural resources eligible for listing or listed in the NRHP). The Louisiana State Historic Preservation Officer (SHPO) and consulting Federally recognized tribes were informed of the USACE finding of no adverse effect on a letter dated April 13, 2010 (Appendix G). The SHPO concurred with USACE eligibility determinations and finding of no adverse effect in a letter dated May 11, 2010, provided the USACE avoids impacts to the Becnel-Perez Mound site (Site 16PL186) and Sites 16PL188, 16PL189, and 16PL190. Nine the Federally recognized tribes were contacted during the consultation process, including the Alabama Coushatta Tribe of Texas, the Caddo Nation of Oklahoma, the Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, the Coushatta Tribe of Louisiana, Mississippi Band of Choctaw Indians, Quapaw Tribe of Oklahoma, the Seminole Tribe of Florida, the Seminole Tribe of Oklahoma, and the Tunica-Biloxi Tribe of Louisiana. The Alabama-Coushatta responded by letter dated May 4, 2010 (Appendix G), concurring with the USACE finding of no adverse effect, and the Choctaw Nation of Oklahoma by letter dated June 15, 2010 (Appendix G), concurring with the USACE finding of no adverse effect.

Alternative C

6.137 The cultural resources survey did not include the MRL tie-in project area. The tie-in levee would be constructed in an area currently composes of two modern roads, a medium strip, and disturbed right-of-way. The likelihood of this area containing intact cultural resources is very low. In the event that implementing Alterative C is necessary, USACE will complete its

responsibilities under Section 106 of the NHPA prior to advertising a request for proposals. This will include cultural resources survey, consultation with the SHPO, Federally recognized Native American tribes, and the public, and determinations of eligibility and effect, if historic properties are located. If historic properties are located, impacts to those properties will be avoided, minimized, or mitigated.

ESTHETICS

Alternative A

6.138 With the No-Action Alternative, visual resources would most likely evolve from existing conditions in a natural process or change as dictated by future land use maintenance practices.

Alternatives B (Proposed Action), B2 (NFS Optional Alignment), and CD

6.139 A viewshed is an area of land, water, or other environmental elements that is visible to the human eye from a fixed vantage point. View sheds from LA-23 and any other public view sheds would most likely be minimal. Those views from private residential areas may be negatively affected by the increased levee heights of the action alternatives.

6.140 The direct and indirect impacts of the action levee alternatives would be positive. Each alternative preserves the "dry" bottom-land hardwood areas and wet pasturelands which in turn would preserve habitat quality. Increased natural features and vegetation create vistas and break up the monotonous, flat terrain of the area which, in turn, could work to enhance view sheds in and around the area, especially from LA-23.

GOVERNMENT FURNISHED BORROW

6.141 Earthen levee construction requires a specific type of clay material which compacts well and prevents seepage. This material has specific requirements related to the amounts of sand, organic material, etc. Approximately 29,048,000 cubic yards of noncompacted clay would be required to upgrade the entire NFL system to the 2 percent LORR. Borrow material is normally acquired by the Government 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 specific contract based on a borrow analysis. A contract-by-contract borrow analysis will be completed. The following updated list of approved Government-furnished borrow areas will be considered: 1418/1420 Bayou Road; 1572 Bayou Road; 4001 Florissant; 910 Bayou Road; Belle Chasse NAS; Triumph East; Bonnet Carre South; Brad Buras; Cummings North; Dockville; West Bank I; West Bank F; Tabony; Bonnet Carre North - Phase 2; West Bank E - Phase 1; West Bank E, Phase 2; West Bank D; Tac Carrere; Stumpf - Phase 1; Stumpf - Phase 2; Johnson/Crovetto; and Bazile. The NEPA process for all potential Government-furnished borrow sources has been previously documented under several Individual Environmental Reports (IER), including IERs 18, 22, 25, and 28.

6.142 Prior to any borrow acquisition; the USACE will review the existing environmental documentation to ascertain if additional impact analysis or agency coordination will be necessary. If so, the USACE will produce an updated Environmental Assessment for that particular borrow area.

Assumptions of This Analysis

6.143 Information for the discussions of Government-furnished 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 NFL project was presented previously in Section 4 of this document, and a transportation analysis of routes from Government-furnished borrow area to the identified staging areas is presented in Section 6. More detailed information, including borrow alternatives, 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.

6.144 Mitigation for borrow impacts is proposed in the Mitigation Plan (Appendix J).

6.145 Exact borrow locations will be chosen through a future contract-by-contract borrow analysis. Consequently, it is not presently known which Government-furnished sites will be utilized nor the acreages of borrow taken from those sites. Impacts presented below represent all of the Government-furnished sites described within IERs 18, 22, 25, and 28. Actual borrow impacts related to the modification or replacement of the NFLs may be less than the total acres represented by the collective borrow locations.

Wetlands

6.146 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 bottom-land hardwood 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 Corps was completed for each potential borrow area. At this time, the USACE plans to avoid impacts to Clean Water Act Section 404 jurisdictional wetlands associated with providing borrow material for authorized hurricane protection construction.

6.147 With use of the proposed Government-furnished borrow sources, no direct or indirect impact to 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.

Bottom-Land Hardwoods

6.148 Nonjurisdictional bottom-land hardwood 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 Clean Water Act Section 404 jurisdictional wetland: hydrophytic vegetation, hydric soils, and/or wetland hydrology. Manmade ditches, canals, and/or pumping stations are present at some of the proposed borrow areas.

6.149 With use of the proposed Government-furnished borrow sources, there may be direct and indirect impacts to bottom-land hardwood forest. 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.

6.150 Table 6.8 presents the combined impacts to bottom-land hardwoods from excavation of the Government-furnished borrow locations described in IERs 18, 22, 25, and 28. The collective impacts include total of 1,658.04 acres and 608.66 Average Annualized Habitat Units (AAHU) of nonjurisdictional bottom-land hardwoods. (Habitat Units (HU) represent a numerical combination of habitat quality [Habitat Suitability Index] and habitat quantity [acres] within a given area at a given point in time. The AAHUs represent the average number of HUs within any given year over the project life for a given area.)

TABLE 6-8
GOVENRMENT-FURNISHED BORROW BOTTOM-LAND HARDWOOD IMPACTS

Proposed Borrow	Parish	Area Parish Bottom-Land Hardwoods Impacted	AAHUs Needed (acres)
4001 Florissant	Bernard	0.0	0.0
910 Bayou Road	Bernard	0.0	0.0
West Bank E - Phase 1	Jefferson	25.1	13.1
West Bank E - Phase 2	Jefferson	53.2	27.8
West Bank F	Jefferson	148.0	85.0
West Bank I	Jefferson	9.76	4.64
Churchill Farms, Pit A	Jefferson	29.9	10.62

TABLE 6-8 (Cont)

Proposed Borrow	Parish	Area Parish Bottom-Land Hardwoods Impacted	AAHUs Needed (acres)
Stumpf - Phase 1	Orleans	318.0	88.0
Stumpf - Phase 2	Orleans	519.0	143.0
Maynard	Orleans	44.0	14.65
Cummings North	Orleans	182.0	54.14
Westbank Site G	Orleans	82.0	45.52
Belle Chasse	Plaquemines	8.0	3.68
Bazile	Plaquemines	11.6	3.93
Triumph East	Plaquemines	0.0	0.0
Bonnet Carre South	Plaquemines	0.0	0.0
Bonnet Carre North - Phase 2	Plaquemines	0.0	0.0
Brad Buras	Plaquemines	(9, nonbottom-land hardwoods)	0.0
Westbank N	Plaquemines	0.0	0.0
Tabony	Plaquemines	86.93	28.9
Tac Carrere	Plaquemines	17.1	12.1
1418/1420 Bayou Rd.	St. Bernard	13.0	6.2
1572 Bayou Rd.	St. Bernard	3.7	1.79
Dockville	St. Bernard	98.7	61.24
Johnson/Crovetto	St. Bernard	8.05	4.35
Total		**1,658.04**	**608.66**

6.151 Mitigation for unavoidable bottom-land hardwood impacts associated with the Government-furnished borrow locations described in IERs 18, 22, 25, and 28 will be addressed in separate mitigation IERs. 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 IER planning process in an effort to complete mitigation work and construct mitigation projects expeditiously. A CED will be prepared once the IERs are completed documenting and compiling these unavoidable impacts. Mitigation planning is being carried out for groups of IERs, rather than within each IER, so that large mitigation efforts could be taken rather than several smaller efforts, increasing the relative economic and ecological benefits of the mitigation effort. The mitigation IER and draft CED will be made available for public review and comment.

Nonwetland Resources/Upland Resources

6.152 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.

6.153 With use of the proposed Government-furnished borrow sources, direct impacts to nonwetland 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

6.154 Use of the proposed Government-furnished 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

6.155 There are no known fisheries resources at the proposed Government-furnished borrow sites.

Wildlife

6.156 The collective study areas comprising the proposed Government-furnished 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. 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 nonpoisonous snakes.

6.157 With use of the proposed Government-furnished 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 Government-furnished borrow areas. Construction contractors will 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.

Threatened and Endangered Species

6.158 Use of the proposed Government-furnished borrow sources is not likely to adversely affect T&E species or their critical habitats. The brown pelican, which was officially removed from the T&E species list in December 2009, may be present in the vicinity of some borrow locations. This species remains protected under the Migratory Bird Treaty Act. However, no brown pelicans were observed at the borrow areas described in this document. The FWS 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

6.159 The Government-furnished 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 proposed borrow areas and the areas of potential effect (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.

6.160 With implementation of the use of the proposed Government-furnished borrow sources, no known significant cultural resources would be impacted because they would be buffered and avoided. Consultation included correspondence with the State Historic Preservation Officer (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 National Register of Historic Places properties within the proposed Government-furnished borrow areas will 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

6.161 With use of the proposed Government-furnished borrow sources, there would be short duration impacts to air quality that would result from the construction of borrow areas. These impacts would be controlled by proper best management practices (BMP). 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

6.162 Despite the use of BMPs, with borrow excavation there would be some disturbances to water quality in the immediate vicinity of the proposed 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 semicompacted 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. Once mining activities at borrow locations have ceased, USACE contracts will stipulate that residual side slopes will be 4:1 or more gently sloping to improve wildlife access and revegetation capability while allowing safer user-access. 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.

Esthetic (Visual) Resources

6.163 It is recognized that some proposed borrow areas are adjacent to residential areas where their existence may not be considered as positive environmental features. With that said, all approved borrow areas should be developed as positive environmental features. Therefore, they should be designed and constructed with gradual side slopes, irregular shapes and have some islands, and where practical vegetation should be allowed to serve as its backdrop. Where it is not feasible to develop these borrow sites as positive environmental features, measures such as landscaping should be utilized to screen off negative view sheds into the borrow areas.

Noise

6.164 With use of the proposed Government-furnished borrow sources there would be adverse noise impacts, especially to 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 right-of-way 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

6.165 With implementation of the proposed action, 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. 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 truck loads necessary to complete construction of the HSDRRS and the effects of transporting these materials. Transportation analyses for use of borrow for the modification and replacement of the Plaquemines Parish NFL is included in Section 6 of this document.

HTRW

6.166 An ASTM E 1527-05 Phase I Environmental Site Assessment (ESA) was completed for the proposed government furnished borrow areas. The Phase I ESA documented the Recognized Environmental Conditions (REC) for the proposed project areas. If a REC cannot be avoided, due to the confirm presence or absence of contaminants, actions to avoid possible contaminants. 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.

CUMULATIVE EFFECTS

6.167 Cumulative effects can result from many different activities, including the addition of materials to the environment from multiple sources, repeated removal of materials or organisms from the environment, and repeated environmental changes over large areas and long periods. Complicated cumulative effects occur when stresses of different types combine to produce a single effect or suite of effects. Large, contiguous habitats can be fragmented, making it difficult for organisms to locate and maintain populations in disjunct habitat fragments. Cumulative impacts may also occur when the timing of perturbations are so close in space that their effects overlap.

6.168 Alternative A, the no-action alternative, is not expected to cumulatively have a direct short- or long-term effect on natural resources within the project area. However, this action may indirectly contribute to increasing the risk to public safety from a catastrophic storm event.

6.169 Alternatives B (Proposed Action) and C would provide a 2 percent LORR while Alternative B2 would provide a 1 percent LORR for Section 1 in addition to a 2 percent LORR for Sections 2-5. Beneficially, each of these alternatives reduce the risks that floods and subsequent floods often bring in the form of contamination of drinking water supplies, dispersion of HTRW, and dispersion of large quantities of solid waste that require cleanup and disposal. Experience has shown that vast quantities of debris (e.g., homes, vehicles, mobile homes, etc.) and sediment must be collected and hauled away after a major flooding event. Hauling the collected debris to a local municipal landfill requires significant transportation and involves large quantities of solid waste that fill available landfill space. In addition to providing an increased LORR for life and property, beneficial cumulative effects of implementing Alternative B, B2, or C includes the temporary expansion of the local economy through the influx of construction-related expenditures.

6.170 Negative effects associated with implementation of Alternative B, B2, or C would relate to these alternatives' cumulative contribution to the effects of other projects, past and present. These cumulative effects include temporary construction-related increases in truck traffic, noise and vibration, vehicle and equipment emissions, and minor localized degradation of water quality. While habitat losses of aquatic habitat, terrestrial habitat, or wetlands resulting from this project's implementation would be mitigated, the total loss of habitat related to the implementation of all actions of this nature within the Barataria Basin, past and present, is significant.

6.171 The Hurricane and Storm Damage Risk Reduction System (HSDRRS) for the Greater New Orleans area is comprised of numerous features including levees, floodwalls, floodgates, surge barriers, and pump stations. Hurricane Katrina made landfall at Buras, Louisiana, in Plaquemines Parish about 1 hour south of New Orleans causing unprecedented damage. The total loss of habitat related to the implementation of all HSDRRS actions under all of the IERs has not yet been compiled, but current HSDRRS totals and incremental impact of actions considered in this document are displayed in Table 6-9, Project Impacts and Compensatory mitigation to be completed.

TABLE 6-9
PROJECT IMPACTS AND COMPENSATORY MITIGATION TO BE COMPLETED

Alignment Alternative	Bottom-land Hardwoods Wet		Bottom-land Hardwoods Dry		Wet Pasture		Swamp		Scrub Shrub		Marsh	
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs
Alternative A	0.0		0.0		0.0		0.0		0.0		0.0	
Alternative B	124.6	85.8	17.7	12.1	146.9	50.6	24.9	21.1	1.4	0.0	26.5	15.8
Alternative B2	146.0	100.9	20.4	13.8	146.9	50.6	67.6	57.4	1.4	0.0	43.4	26.8
Alternative C	27.3	19.2	9.0	5.7	73.6	25.7	24.9	21.1	0.0	0.0	19.3	12.1
Cumulative IERs	869.3	492.6	3096.6	713.0	0.0	0.0	487.5	74.0	0.0	0.0	966.1	488.6
TOTALS	1,167.2	698.4	3,143.7	744.6	367.4	126.9	604.8	173.7	2.8	0.0	1,055.3	543.2

6.172 Corps project schedule and design have been coordinated among in-house Project Delivery Teams. The Corps has also worked closely with the State of Louisiana and other agencies to ensure that other projects such as ongoing marsh creation activities are factored into the design and construction process. Although there will be short periods of time during construction of the levees when restoration projects such as the Naomi and West Pointe a la Hache siphons will be temporarily unavailable (30 to 60 days), no other interruption of such projects is anticipated. The Corps will continue this coordination throughout project construction.

6.173 The construction-related negative effects as well as the positive consequences (e.g., spending in the local economy) resulting from Alternatives B and C providing a 2 percent level of hurricane damage risk reduction for the project area may potentially represent the largest cumulative environmental consequences in the project for the next 4 to 7 years. Likewise, Option B2 providing a 1 percent level of hurricane damage risk reduction for the project area would result in similar, but significantly greater cumulative environmental consequences.

Geographic Boundaries

6.174 Although the project area is limited to Plaquemines Parish west of the Mississippi River, cumulative impacts involve the broader coastal basin. For that reason, most of the information in this cumulative impacts analysis applies to the Barataria Basin in general. Information used in this report has been gathered from published sources and government documents.

Temporal Boundaries

6.175 The cumulative impacts on the Barataria Basin began with the construction of flood damage reduction levees, both private and Federal, in the early 1800s to present. The Mississippi River mainline levee effectively cut off sediment flow into the marsh of the Barataria Basin. Sediment that would normally build and replenish marsh as the Mississippi overflowed its banks is now directed into the Gulf of Mexico. More than 17 percent of documented marsh loss in the Barataria Basin occurred since 1932 (Dunbar, et al., 1992). Because the mainline Mississippi River levee would remain authorized until Congress determines otherwise, its status must be considered indefinite.

Natural Resources

6.176 This EIS includes considerations of the effects of levee alternatives on natural resources of the area, including fish habitat, protected species, wetlands, and others described in the report. This cumulative impacts discussion focuses on the primary issue affecting these natural resources, land loss and plant community changes due to saltwater intrusion. The hydrologic alterations that have had the most significant impact on these resources are navigation corridors. These changes have affected hydrology by channeling saltwater into the historically low-salinity estuary. Secondary causes of landscape change include storms, petrochemical exploration, and herbivory.

Historical Landscape Change

6.177 Abundant evidence indicates that the Barataria Basin was historically fresher than it is today. Both O'Neil (1949) and a 1951 Soil Conservation Service vegetation map of Plaquemines Parish had broad expanses of unbroken sawgrass (*Cladium jamaicense*) marsh (USDA, 1951, in Louisiana Coastal Wetlands Conservation and Restoration Task Force (LCWCRTF), 2002). Sawgrass is found in fresh and intermediate marshes and tolerates salinities between 0 and 2 ppt (Penfound and Hathaway, 1938). At the time of the 1951 survey, sawgrass marsh covered much of Plaquemines Parish and was the dominant vegetative community.

6.178 Many acres of wetlands in the Barataria Basin have been converted to open water. Biologists, ecologists, and natural resource managers who possess intimate knowledge of the historical events that shaped the ecosystem were interviewed by the LCWCRTF to determine specific causes of land changes in the basin. The scientists attribute virtually all of the habitat changes and land losses in the basin to a combination of human-induced hydrologic changes, sometimes accompanied by severe storm events.

Land Management and Wetland Restoration

6.179 There are numerous hydraulic modifications for flood damage reduction, including the back levee and five pump stations, MRL, and the Federal NOV back levee.

6.180 Numerous land stewardship projects have been implemented in the Barataria Bay Basin to help restore its wetlands and estuaries and protect its shoreline. Table 6-10 lists completed and ongoing restoration and management projects in the basin funded by the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). These projects have, or are, expected to have beneficial impacts on natural resources in the project area.

Reasonably Foreseeable Future Actions

6.181 With implementation of the proposed action, the NFL would be upgraded to Federal standards and connected to the existing Federal levee. The USACE anticipates continuing maintenance of the Federal levee system indefinitely. Reasonably foreseeable actions include the continued construction of HSDRRS projects in the general area, as well as the planned construction of the NOV project.

TABLE 6-10
CWPPRA PROJECTS IN THE PLAQUEMINES PARISH,
LOUISIANA VICINITY

Project ID	CWPPRA Project
BA-03c	Naomi Outfall Management
BA-04c	West Pointe a la Hache Outfall Management
BA-33	Delta Building Diversion at Myrtle Grove
BA-35	Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration
BA-38	Barataria Barrier Island Complex Project: Pelican Island and Pass La Mer to Chaland Pass Restoration
BA-39	Mississippi River Sediment Delivery System - Bayou Dupont
BA-40	Riverine Sand Mining/Scofield Island Restoration
BA-42	Lake Hermitage Marsh Creation
BA-47	West Pointe a la Hache Outfall Management
BA-68	Grand Liard Marsh and Ridge Restoration
BA-76	Cheniere Ronquille Barrier Island Restoration
BS-03a	Caernarvon Diversion Outfall Management
BS-10	Delta Building Diversion North of Fort St. Philip
BS-11	Delta Management at Fort St. Philip
BS-12	White Ditch Diversion Restoration and Outfall Management
BS-13	Bayou Lamoque Freshwater Diversion
BS-15	Bohemia Mississippi River Reintroduction
BS-18	Bertrandville Siphon
LA-03a	Nutria Harvest for Wetland Restoration Demonstration
LA-03b	Coastwide Nutria Control Program
LA-05	Floating Marsh Creation Demonstration
LA-30	Coastwide Reference Monitoring System
MR-03	West Bay Sediment Diversion
MR-06	Channel Armor Gap Crevasse
MR-09	Delta Wide Crevasses
MR-10	Dustpan Maintenance Dredging Operation for Marsh Creation in the Mississippi River Delta Demonstration
MR-11	Periodic Introduction of Sediment and Nutrients at Selected Diversion Sites Demonstration (Deauthorized)
MR-12	Mississippi River Sediment Trap
MR-13	Benneys Bay Diversion
MR-14	Spanish Pass Diversion
MR-15	Venice Ponds Marsh Creation and Crevasses
PO-27	Chandeleur Islands Marsh Restoration

Incremental Effects of Proposed Project

6.183 Cumulative impacts associated with past actions have produced a natural environment that is markedly different from that of presettlement times. However, the Barataria Basin is still a valuable ecosystem. The proposed project would not exacerbate existing conditions in the area. The environmental effects of the proposed project would not contribute adverse increments to the cumulative effects of past, present, and reasonably foreseeable actions.

INDIRECT IMPACTS

6.184 Indirect impacts "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR Section 1508.8).

6.185 Indirect impacts associated with the proposed project are described in each section of this report discussing specific resources or issues. In summation, the action plans would offer socioeconomic benefits to the project area and avoid and/or minimize impacts to the natural environments. The project would be beneficial to the regional and national economy by providing a 2 percent level of storm surge risk reduction for people, property, and LA-23.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

6.186 The No-Action Alternative would involve no irreversible or irretrievable commitments of resources. The proposed action alternatives would require irreversible and irretrievable commitments. The expenditure of funding, energy, labor, and materials would be required. Land needed to enlarge the levee would be permanently altered, essentially for as long as the project is authorized.

6.187 The proposed maintenance of the levee would not cause the permanent removal or consumption of any renewable resources. Although incorporating certain non-Federal levees into NOV may have induced changes in land use, no appreciable additional changes are expected to result from the proposed maintenance actions.

6.188 Project implementation would irreversibly and irretrievably commit some lands, including wetlands, to uplands, water control structures, and other features of associated with levee construction.

UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

6.189 All alternatives evaluated have unavoidable adverse direct and indirect environmental effects that are discussed in this document. The No-Action Alternative would adversely affect the regional and national socioeconomic environment by restricting hurricane protection to current levels. The action alternatives, including the Proposed Action, would convert uplands, wetlands, and open water areas to levees. The placement of borrow material in open water areas to build the levee would eliminate aquatic communities.

6.190 The selection of the Proposed Action was the culmination of a process to select an alternative plan that would avoid and minimize adverse effects to the socioeconomic and natural environment. Unavoidable adverse environmental effects of the project would be compensated.

ENVIRONMENTAL JUSTICE

6.191 Executive Order 12898, which addresses Environmental Justice (EJ), focuses Federal attention on the environmental and human health conditions in the minority and low-income communities, enhances the provisions of nondiscrimination in Federal programs affecting human health and the environment, and promotes meaningful opportunities to the access of public information and participation in matters relating to minority and low-income communities and their environment.

6.192 Residents and industries of the area are aware that, due to the topography of the land and the climatic conditions prevalent in the region, flooding remains a constant threat to their physical and economic welfare and, with or without additional protective measures; they may or may not be prepared or protected if another major natural disaster event occurs. The Corps is working with the local citizenry and both local and Federal organizations to identify, design, and provide levee replacements or modifications to reduce the risk of flooding and levee breach during hurricanes and other high water events.

Alternative A

6.193 The No-Action Alternative is not expected to have any direct, long-term adverse EJ effects in the project area. However, no action would result in the continued risk of overtopping NFL by hurricane storm surge. All resources in the project area, socioeconomic and biological would be subject to resulting damages or losses in the event of a levee breach. Any losses experienced are expected to affect minority and low-income and non-minority and non-low-income populations alike. Thus, impacts from no action are not anticipated to exert "disproportionately" high indirect, adverse human, health, or environmental impacts on minority and/or low-income residents or communities.

Alternatives B (Proposed Action), B2, and C

6.194 Implementation of the recommended levee alignments is not expected to have any direct, long-term adverse effects on EJ in the project area. EJ impacts are expected to be near the same for Alternatives B, B2, and C. The proposed action (Alternative B) would incorporate the NFL into the Federal levee system and provide a 2 percent LORR (i.e., reducing the risk of damage up to the 50-year frequency flood event) for approximately 2,200 residents, 800 homes, 16,000 acres of land, with associated infrastructure, and numerous biological resources in the project area. It is designed to stabilize and enhance the risk reduction capability of the existing NFL by raising levee heights 3 to 4 feet in the northern portion of the project and up to 8 feet in the southern portion. This would enhance flood risk improvements to many residents, homes, businesses, agricultural lands, roads, bridges, and other impacted biological resources. Project completion would allow residents go to work, take their children safely to school, attend to normal daily needs and continue their livelihoods with reduced interference or hazard from floodwaters. Businesses and industries would operate with reassurance that the levee has increased resilience and greater risk reduction capability.

ENVIRONMENTAL HEALTH AND SAFETY RISKS TO CHILDREN

6.195 Executive Order 13045, which addresses "Protection of Children from Environmental Health Risks and Safety Risks," focuses Federal attention on identifying and addressing any potential environmental safety and human health conditions that could disproportionately affect children. In the project area, residents, families, and communities are aware that, due to the topography of the land and the climatic conditions prevalent in the region, flooding remains a constant threat to their physical and economic welfare and, with or without additional protective measures, they may or may not be prepared or protected if another major natural disaster event occurs. The Corps is working with the local citizenry and both local and Federal organizations to identify, design, and provide levee replacements or modifications to reduce the risk of flooding and its impacts on the human population and environment, including health and safety risks to children.

Alternative A

6.196 No-Action Alternative is not expected to have any direct, long-term adverse effects in the project area. However, no action would result in the continued risk of overtopping NFL by hurricane storm surge. All resources in the project area, socioeconomic and biological (including children), would be subject to resulting health and safety risks, damages, or losses in the event of a levee breach. Any losses experienced are expected to all segments of the population alike, including children. Thus, no disproportionate impacts on children from no action are anticipated.

Alternatives B (Proposed Action), B2, and C

6.197 Implementation of the recommended levee alignments is not expected to have any direct, long-term adverse health and safety effects on children in the project area. Impacts are also expected to be near the same for Alternatives B, B2, and C. The proposed action (Alternative B) would incorporate the NFL into the Federal levee system and provide a 2 percent LORR (i.e., reducing the risk of damage up to the 50-year frequency flood event) for approximately 2,200 residents, families, 800 homes, and 16,000 acres of land, with associated infrastructure, and numerous biological resources in the project area. It is designed to stabilize and enhance the risk-reduction capability of the existing NFL by raising levee heights 3 to 4 feet in the northern portion of the project and up to 8 feet in the southern portion. This would enhance flood risk improvements to many residents, homes, businesses, agricultural lands, roads, bridges, and other impacted biological resources. Project completion would allow residents to go to work, take their children safely to school, attend to normal daily needs, and continue their livelihoods with reduced interference or hazard from floodwaters. Businesses and industries would operate with reassurance that the levee has increased resilience and greater risk-reduction capability.

Indirect Impacts

6.198 **Alternative A**. The No-Action Alternative is not expected to have a direct, long-term adverse effect on indirect impacts in the project area. However, no action would result in the continued risk of overtopping NFL by hurricane storm surge.

6.199 **Alternatives B (Proposed Action), B2, and C**. The proposed actions would enhance Federal hurricane risk reduction in an area that currently has a much lower LORR. Indirect impacts from these actions may include residential and commercial growth within the protected area which will actually result in benefits from the additional economic activity. Indirect impacts are not anticipated to exert "disproportionately" high indirect, adverse human, health, or environmental impacts on minority and/or low-income communities as a result of the proposed actions.

Cumulative Impacts

6.200 As previously discussed, cumulative effects on the environment can result from many different activities, such as, in this study, the construction of the proposed actions in the project area. Thus, the addition and removal of various materials or organisms in the environment and repeated environmental changes over large areas and long periods of time can have multiple and complicated cumulative environmental effects on various habitat.

6.201 **Alternatives A**. The No-Action Alternative is not expected to have a direct, long-term adverse effect on cumulative environmental impacts in the project area.

6.202 **Alternatives B (Proposed Action), B2, and C**. The proposed actions would enhance Federal hurricane risk reduction in the project via construction of features in the general vicinity of existing hurricane risk reduction features. Therefore, no incremental adverse impacts are expected to occur from these actions.

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

6.203 Socioeconomic benefits and adverse environmental impacts represent tradeoffs between the local short-time use and the long-term stability and productivity of the environment. Implementation of the Proposed Action would convert approximately 420 acres of bottom-land hardwood, marsh, and wet pasture habitat to upland habitat. Impacts to aquatic and wetland habitats would be compensated through the use of reforestation and marsh restoration, thereby enhancing long-term productivity of the environment.

U. S. FISH AND WILDLIFE SERVICE COORDINATION

6.204 The FWS has prepared a draft Fish and Wildlife Coordination Act (FWCA) report in accordance with provisions of the FWCA of 1958, as amended. The FWCA report is found at Appendix B of this document. The FWS does not object to providing enhance hurricane risk reduction to Oakville to St. Jude in Plaquemines Parish, provided the following fish and wildlife conservation recommendations are incorporated into future project planning and implementation.

1. To the greatest extent possible, design (e.g., implementation of "T"-walls, sheet-pile, and/or cement floodwall in levees designs) and position flood protection features so that destruction of forested and emergent wetlands and nonwet bottom-land hardwoods areas are avoided or minimized.

Response. Concur. Design of levee sections avoided all sensitive resource areas unless engineeringly impossible based on stability or proximity to private dwellings.

2. The Corps shall fully compensate for any unavoidable losses to wet and nonwet bottomland hardwood habitat (-97.88 AAHUs), swamp habitat (-21.13 AAHUs), fresh marsh (-6.84 AAHUs), brackish marsh (-8.92 AAHUs), and wetland pasture (-50.62 AAHUs) caused by project features. Specific guidance and recommendations regarding details for mitigation planning, as well as locations of mitigation priority areas, are included in Appendix A of the draft FWCA report.

Response. Concur. Compensatory mitigation for each resource category impacted from project construction is outlined in the draft mitigation plan found in Appendix J.

3. Minimize enclosure of wetlands with new and/or expanded levee alignments. When enclosing wetlands is unavoidable, acquire nondevelopment easements on those wetlands, or maintain hydrologic connections with adjacent, unenclosed wetlands to minimize secondary impacts from development and hydrologic alteration.

Response. Concur. Current authorization restricts levee alignment to follow the existing levee.

4. If a proposed project feature is changed significantly or is not implemented within 1 year of the 16 December 2010, Endangered Species Act consultation letter, we recommend that the Corps reinitiate coordination with FWS to ensure that the proposed project would not adversely affect any Federally listed threatened or endangered species or their critical habitat.

Response. Concur. Coordination will be reinitiated as applicable.

5. Avoid adverse impacts to wading bird nesting colonies and bald eagle nesting locations 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., 16 February - 31 October for wading bird colonies and October - mid-May for bald eagles).

Response. Concur.

6. 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 nonnesting period (i.e., 1 September - 15 February, exact dates may vary within this window depending on species present). In addition, we recommend that onsite 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. Concur. We will work with the contractors and LDWF to identify colonies.

7. 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 online at http://www.fws.gov/southeastleslbaldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to the FWS Lafayette Field Office.

Response. Concur.

8. Forest clearing associated with project features should be conducted during the fall or winter to minimize impacts to nesting migratory birds to the maximum extent practicable.

Response. Concur. To the maximum extent practicable, timing of construction will be coordinated to minimize impacts to nesting migratory birds. The majority of the construction area is previously disturbed non forested areas.

9. Acquisition, habitat development, and 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 Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

Response. Concur. First cost and maintenance will be the responsibility of the Corps until success criteria is achieved as outlined in the mitigation plan found in Appendix J. Management of the lands will be site-specific based on coordination with state and Federal agencies, in addition to the local sponsor.

10. 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 FWS and other state and Federal natural resource agencies, and the Corps shall provide them with an opportunity to review and submit recommendations on all work addressed in those reports.

Response. Concur.

11. 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. Concur.

12. If applicable, a General Plan should be developed by the Corps, FWS, and the managing natural resource agency in accordance with Section 3(b) of the FWCA for mitigation lands.

Response. Concur.

13. A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the Corps, FWS, NMFS, EPA, LDNR, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

Response. Concur.

USACE ENVIRONMENTAL OPERATING PRINCIPLES

6.205 This EIS and recommended plan were prepared in accordance with U.S. Army Environmental Operating Principles and the Chief of Engineers "Four Themes," derived from USACE actions for change to the corporate culture. The purpose of the Environmental Operating Principles and Actions for Change is to better serve the Nation's water resources infrastructure. The USACE Environmental Operating Principles are as follows:

1. Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.

2. Recognize the interdependence of life and the physical environment and consider environmental consequences of USACE programs and activities in all appropriate circumstances.

3. Seek balance and synergy among human development activities and natural system by designing economic and environmental solutions that support and reinforce one another.

4. Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.

5. Seek ways and means to assess and mitigate cumulative impacts to the environment and bring systems approaches to the full life cycle of the processes and work.

6. Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of the work.

7. Respect the views of individuals and groups interested in USACE activities, listen to them actively, and learn from their perspective in the search to find win-win solutions to the Nation's problems that also protect and enhance the environment.

6.206 The Chief's Four Themes to be employed in all studies are:

1. Employ a comprehensive systems approach in all projects, including adaptive planning and engineering, with a focus on sustainability.

2. Practice risk-informed decision making. Employ risk-based concepts in planning, design, construction, and major maintenance.

3. Communicate risk to the public effectively. Establish public involvement risk reduction strategies.

4. Incorporate professional and technical expertise in staff. Invest in research and development.

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9. 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
NFS	Non-Federal Sponsors
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