DRAFT ENVIRONMENTAL IMPACT STATEMENT
New Orleans to Venice, LA, 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

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The responsible lead agencies are the U.S. Army Corps of Engineers, New Orleans and Vicksburg Districts. The responsible coordinating 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 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 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 April 18, 2011.

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

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SECTION 1

SUMMARY

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 sponsor (NFS), the Louisiana Office of Coastal Protection and Restoration (OCPR), seeks 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 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.

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 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 Environmental Assessment or Supplemental EIS. Construction methods would be employed to minimize the potential of violating the Toxic Effluent Standards of Section 307 of the Clean Water Act. None of the proposed plans would harm any threatened or endangered species or their critical habitat.

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 environmental assessment for that particular borrow area.

REAL ESTATE ACQUISITION

1.15 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

1.16 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 habitat will 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 will not violate applicable state Water Quality Standards nor violate the Toxic Effluent Standards of Section 307 of the CWA.

FINDINGS ON EXECUTIVE ORDER 11988, "FLOODPLAIN MANAGEMENT"

1.17 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"

1.18 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"

1.19 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 1311, "INVASIVE SPECIES"

1.20 The proposed project is not expected to lead to the introduction of any new nonnative invasive species. Clean, earthen borrow material 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)"

1.21 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

1.22 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.

UNRESOLVED ISSUES

1.23 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.

RELATIONSHIP OF PLANS TO ENVIRONMENTAL REQUIREMENTS

1.24 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.	Full compliance upon issuance of the WQC by the state.
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	Complies fully	Disposal of dredged material must comply with the Act.	Full compliance.
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 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

SECTION 2

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SECTION 3

NEED FOR AND OBJECTIVES OF ACTIONS

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.

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 Plaquemines Parish Government (PPG) and the non-Federal project sponsor, Coastal Protection and Restoration Authority (CPRA). 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 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). 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. **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.

5. **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).

6. **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.

7. **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.

8. **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.

9. **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.

10. **Mississippi River Sediment Delivery System – Bayou Dupont**. The Mississippi River Sediment Delivery System – Bayou Dupont project, located adjacent to Bayou Dupont in the vicinity of the town of Ironton, is a proposed marsh creation project designed to restore wetlands in an area which has degraded to open water habitat. The project involves dredging sediment from the Mississippi River and pumping it via pipeline to the marsh restoration area approximately 3 miles to the west of the river, outside upper Section 2 of the NFL. Construction is currently slated for completion in the fall of 2009. The EPA is the Federal sponsor with the local sponsor being LDNR.

11. **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 final EIS for MRGO was completed in 2009. 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.

12. **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. The LCA study made a number recommendations that were ultimately authorized by the Water Resources Development Act (WRDA) of 2007 (Title VII).

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.

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. 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
- 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.

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.

INTERAGENCY COORDINATION

3.33 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.

3.34 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. **If 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.

SECTION 4

ALTERNATIVES

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.

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 approximately 2 miles north of 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

Nonstructural Alternatives

4.3 A number of alternative alignments and different structural methods of risk reduction and nonstructural alternatives were formulated to address hurricane damage reduction. Nonstructural alternatives would include options that might significantly reduce flood damage without the construction of major flood risk reduction structures. Flood damage reduction is achieved from nonstructural measures by changing the use of the flood plain or by accommodating the uses to the flood hazard. Typically, structure relocation, raising structures, flood proofing, and regulation of the flood plain may be involved. According to Section 73 of the Water Resources

Development Act (WRDA 1974), Engineer Regulation (ER) 1105-2-100, nonstructural measures can be considered independently or in combination with structural measures (USACE, 2000). As with the structural alternatives, the criteria used to determine feasibility included engineering effectiveness, economic efficiency, and environmental and social acceptability. Those alternatives that did not adequately meet the criteria were considered infeasible and therefore were eliminated from detailed consideration 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. The cost savings in annual flood insurance premiums, assuming 100 percent flood insurance participation by every property in the flood zone would equal roughly $240,000. This is the maximum value of the potential flood damage reduction benefits of relocation plans. Relocation of the SPH flood plain structures would result in a maximum savings of $240,000 in average annual flood damage reduction benefits, compared to over $200 million in average flood damage reduction costs (the total cost of acquisition and relocation). 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.

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. No reduction in administrative costs of the National Flood Insurance Program (NFIP) and disaster relief programs would be anticipated.

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 consideration as a stand-alone alternative.

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. In addition, certain infrastructure that would need to be operational in a flooding event might have to be raised also (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, with resultant large cost expenditures. In addition to being cost prohibitive, USACE determined the project authorization was for the modification or replacement of existing non-Federal levees. Thus, this alternative 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 alone was found to be prohibitively expensive since a majority of structures would require costly raising and was thus eliminated from further consideration (an average cost of $95 per square foot (USACE 2007a)).

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

4.4 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.

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

4.5 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.

4.6 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

4.7 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.

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

Levee Alignment Alternative Development

4.9 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.

4.10 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).

4.11 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

4.12 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.

4.13 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.

4.14 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.

4.15 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.

4.16 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.

4.17 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.

4.18 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

4.19 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.

4.20 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.

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

4.22 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

4.23 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.

4.24 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.

4.25 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.

4.26 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

4.27 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.

4.28 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).

4.29 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 Section 2, La Reussite to Myrtle Grove

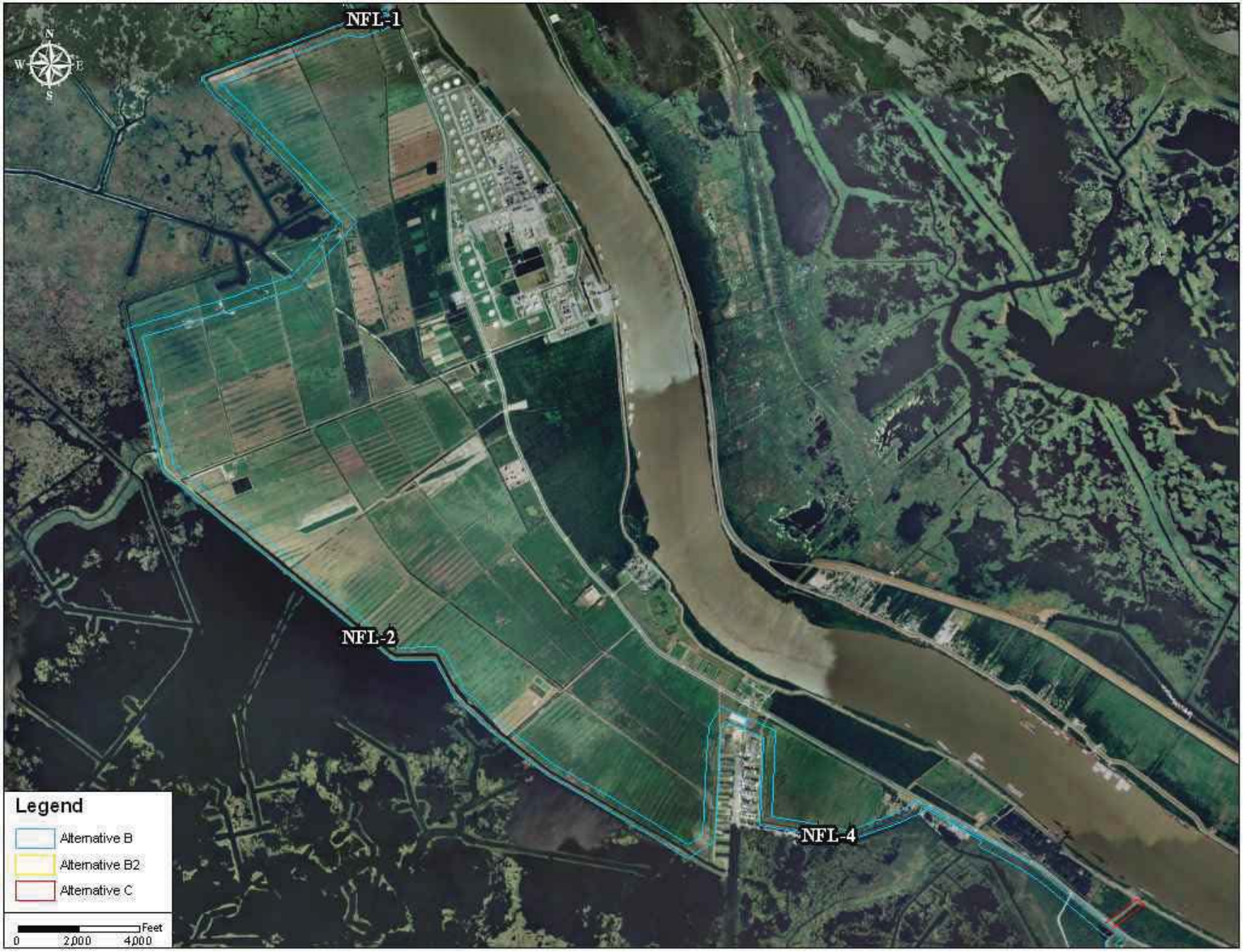

Figure 4-4 Levee Alternatives of Sections 3 and 4, Myrtle Grove to Point Celeste

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.

4.30 Whenever possible, levee enlargement activities were designed as a protected-side shift in order to avoid and minimize impacts to marsh 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 will be compensated for according the mitigation plan (Appendix J).

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.

SECTION 5

AFFECTED ENVIRONMENT

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 Desirable community and regional growth with respect to 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

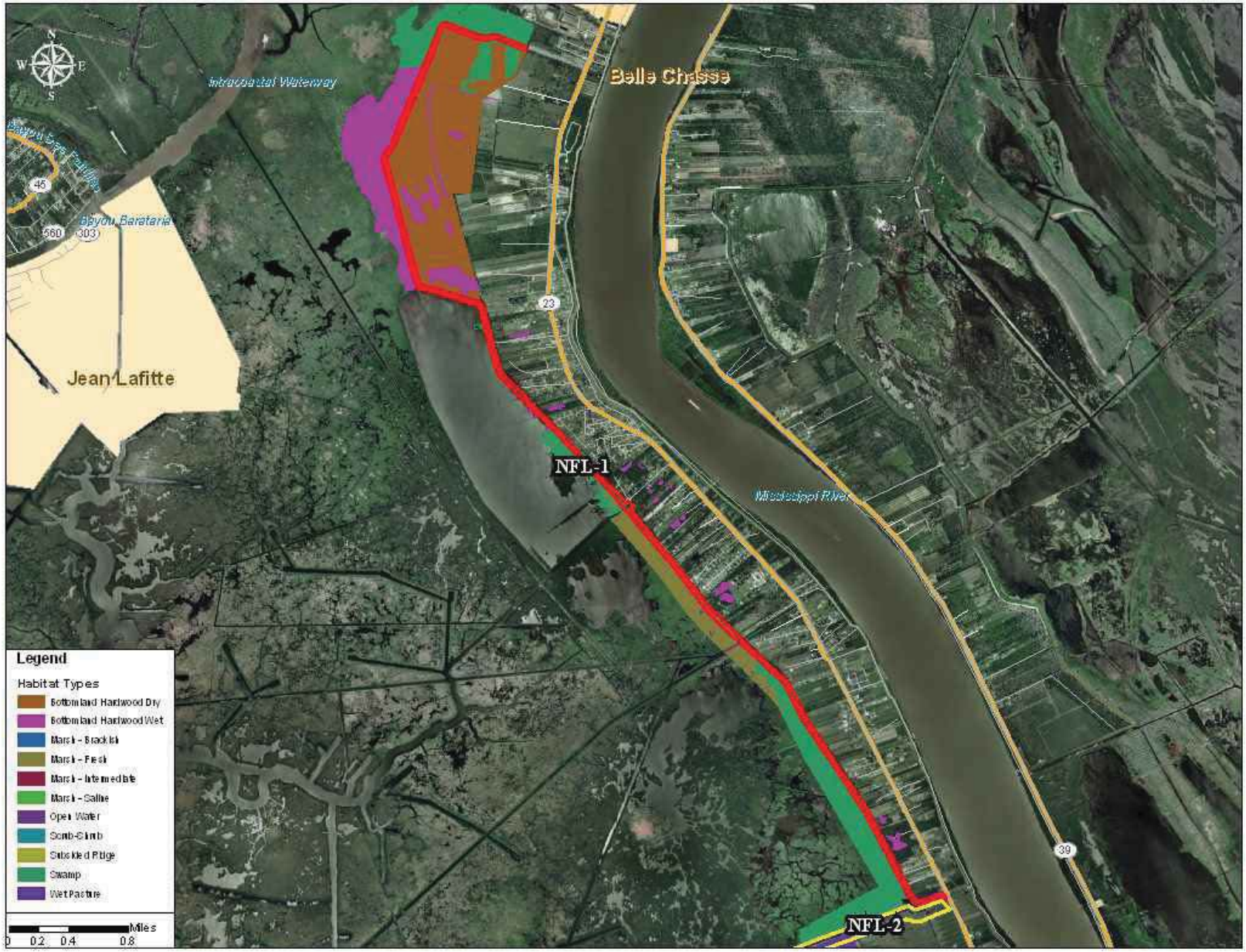

Figure 5-2 Natural Habitats of Section 2, La Reussite to Myrtle Grove

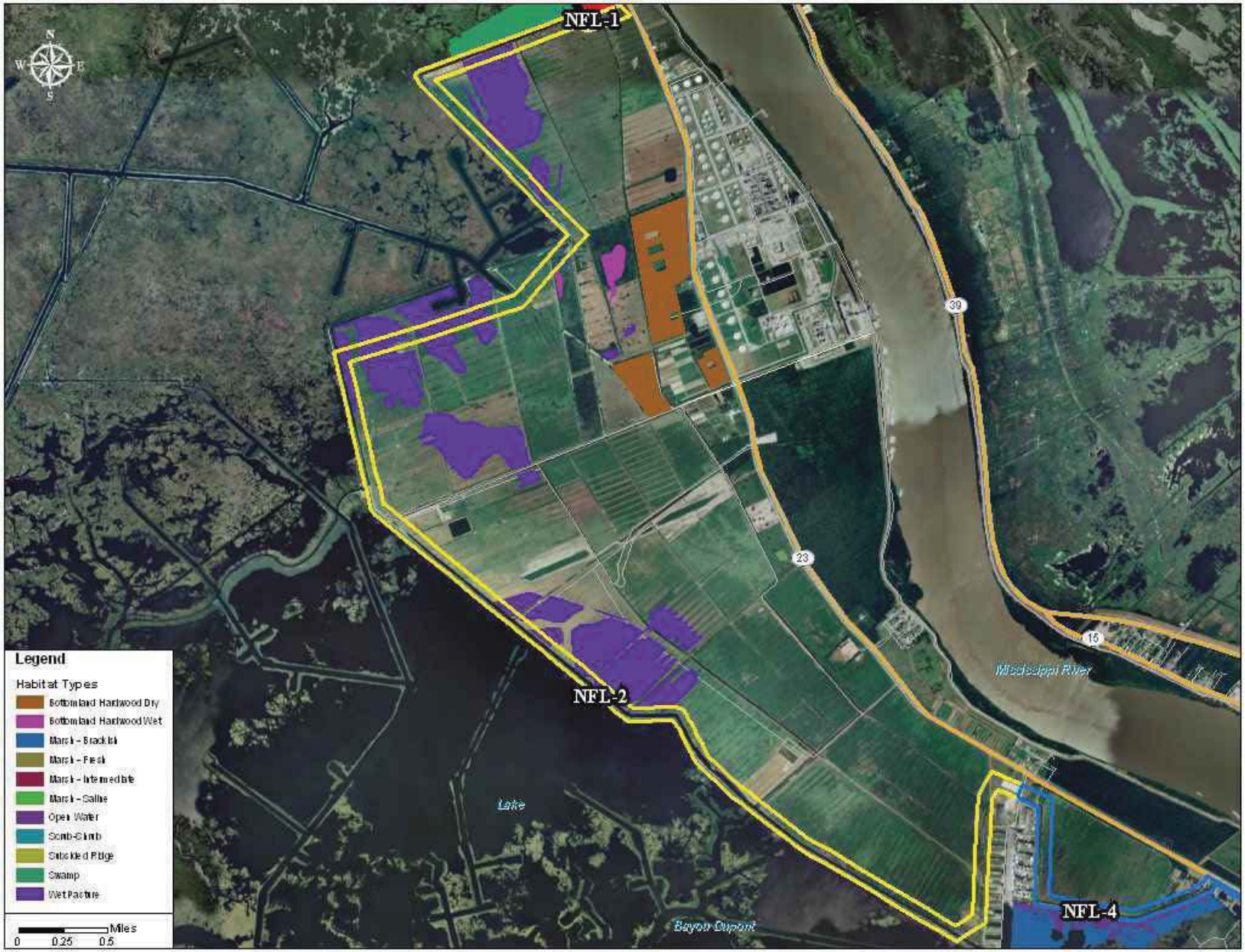

Figure 5-3 Natural Habitats of Sections 3 and 4, Myrtle Grove to Point Celeste

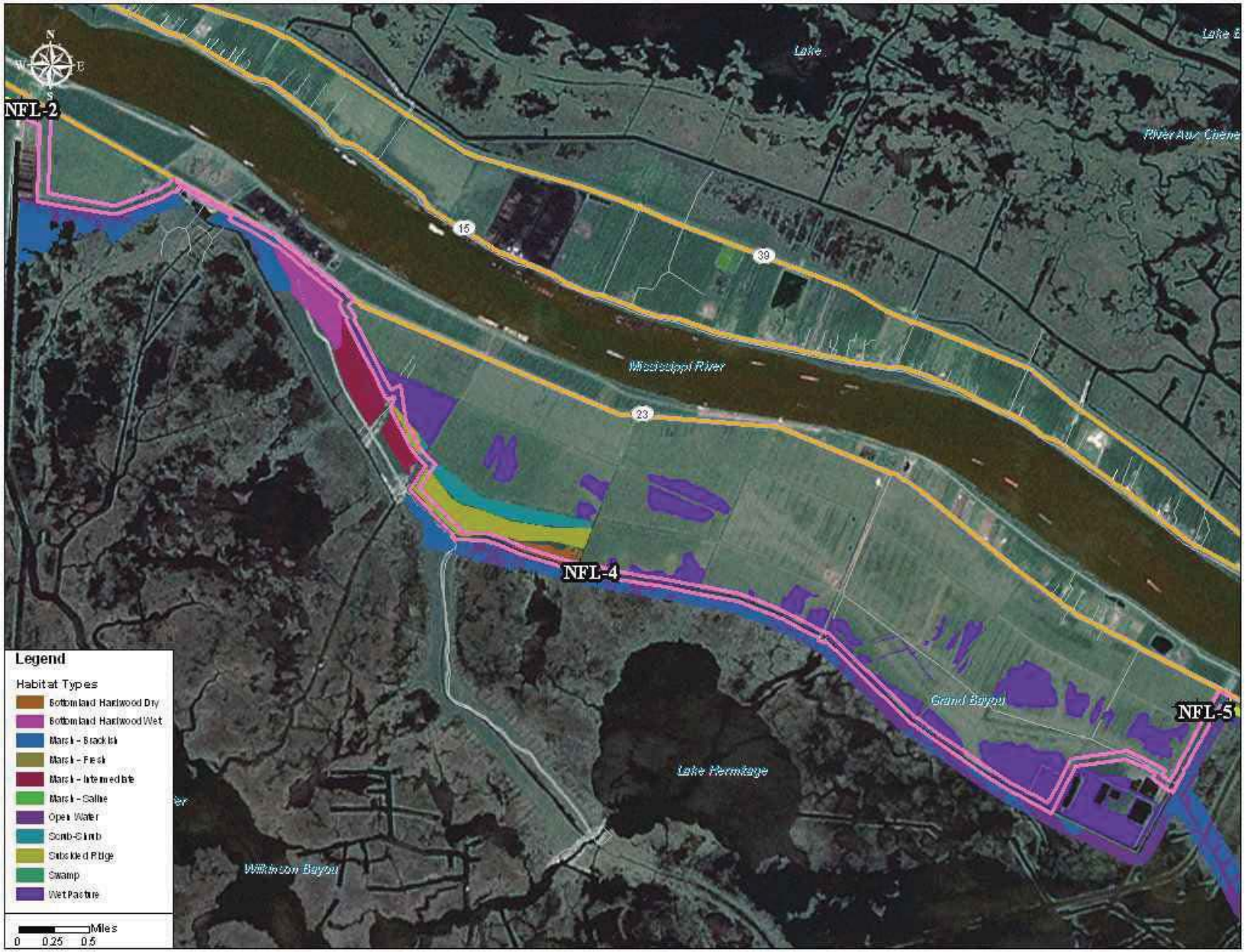

Figure 5-4 Natural Habitats of Section 5, Point Celeste to St. Jude

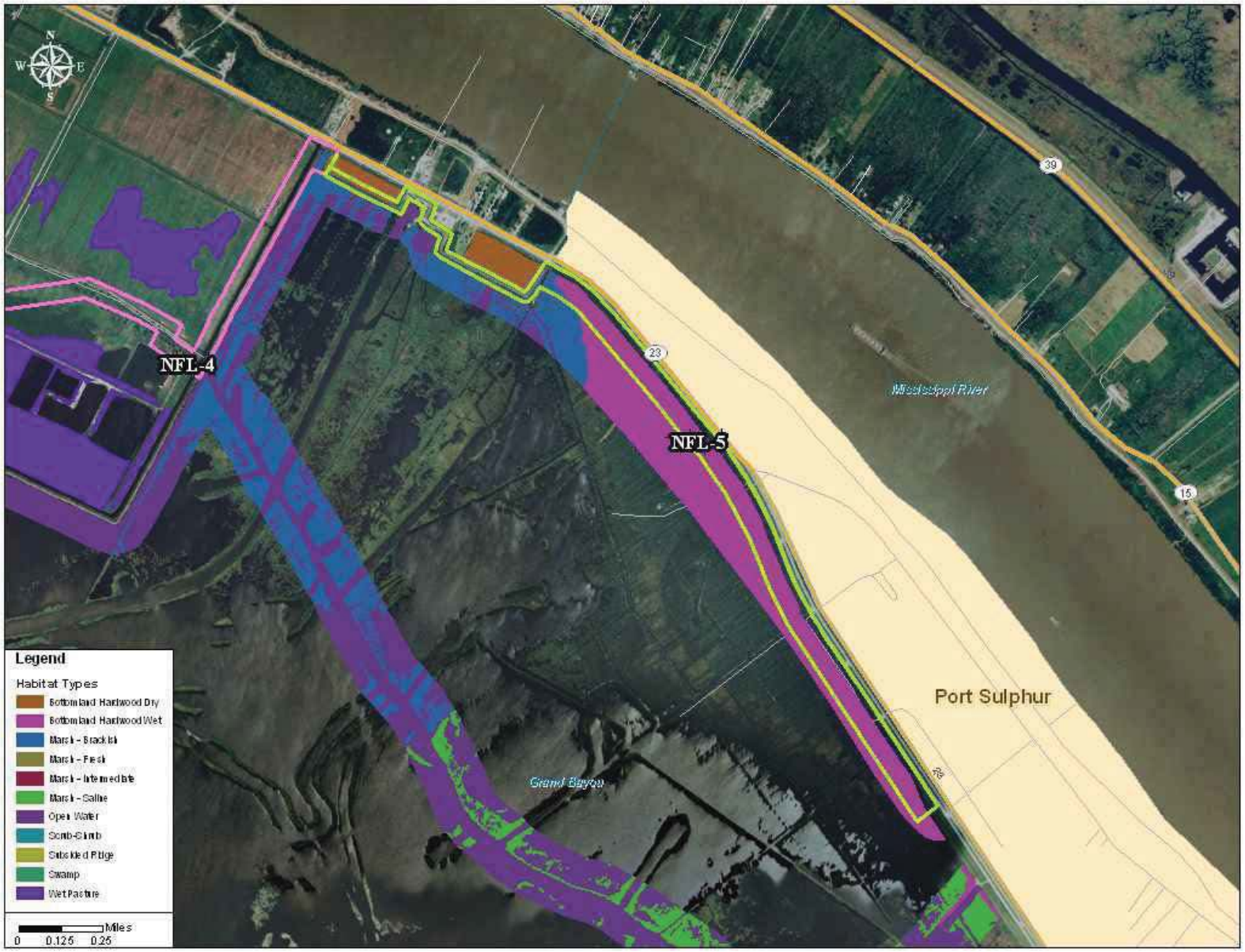

TABLE 5-5
NATURAL HABITATS (ACRES) ENCLOSED BY EXISTING NFL

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 Vicksburg District 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, menhadden, 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. 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, they are 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 within or near the project area.

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 in recent years due to reduced demand for furs. Major furbearing species are raccoon, opossum, mink, bobcat, and nutria. Game species include squirrel, rabbit, and deer.

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. 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 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.

(4) **Reef fish**. Four species of reef fish are known from the Barataria estuary – gray snapper (*Lutjanus griseus*), lane snapper (*L. synagris*), schoolmaster (*L. apodus*), and banded rudderfish (*Seriola zonata*) (Condrey, et al., 1996). Although species within this complex generally occupy similar ecological niches and exhibit similarities in behavior and life stages, a considerable variation in diet and habitat use exists among individual species. Member species of the complex are generally predatory, but the type of prey varies widely among species and ranges from small invertebrates to fishes, including other species within this complex. Larvae and juvenile specimens may be pelagic or estuarine, and adults may occupy estuarine, near-shore, or pelagic environments. The EFH for the reef fish includes SAV, mangrove communities, lagoons, hard bottoms, near-shore habitat, and estuarine sands and muds. The HAPC for the complex includes hard bottom, mangrove communities, SAV, oyster/shell substrates, inlets, and state nursery areas. No designated HAPC for the assemblage occurs within the project area.

(5) **Coastal migratory pelagic species**. Coastal migratory pelagic species are marine fishes that inhabit coastal waters of the Gulf of Mexico from the shoreline to the continental shelf edge. These species migrate seasonally within these coastal waters. Members of this assemblage that are known from the Barataria estuary include the king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*S. maculatus*), and cobia (*Rachycentron canadum*) (Condrey et al, 1996). Coastal migratory pelagics are predatory and generally occupy open marine waters, but subadults may occupy tidal inlets and estuarine environments. The EFH for Coastal migratory pelagic species includes shallow near-shore waters, beaches, and estuarine environments. 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 affected this species throughout its range.

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.

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

Table 5-8 (Cont)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
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
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	

TABLE 5-9 (Cont)

	Count	Avg.	Min.	10%	25%	50%	75%	90%	Max	Criteria
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+NITRIT E 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	
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 Maximun 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.

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 protections 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.

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) were 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).

SECTION 6

ENVIRONMENTAL CONSEQUENCES

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

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
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 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) has been submitted to the Natural Resources Conservation Office for consideration. Consultation is ongoing and findings will be incorporated into the Final EIS.

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 and 85.8 AAHUs of wet bottom-land hardwoods and 17.7 acres and 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 beneficial..

3. **Alternative B2 (NFS Optional Alignment)**. Enlarging the levee would result in the direct loss of 146.0 acres and 100.9 AAHUs of wet bottom-land hardwoods and 20.4 acres and 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 and 19.2 AAHUs of wet bottom-land hardwoods and 9.0 acres and 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 and 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 and 50.6 AAHUs of wet pasture.

4. **Alternative C**. Enlarging the levee would result in the direct loss of 73.6 acres and 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 successional 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 and 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 and 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 and 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 and 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 and 57.4 AAHUs. Indirect impacts would be similar to Alternative B.

4. **Alternative C**. Implementation of this alternative would directly impact 24.9 acres and 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). Onsite contract personnel will be informed of the need to identify colonial nesting birds and their nests and will avoid affecting them during the breeding season.

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 would cause mobile aquatic animals to relocate during construction activities. Sessile aquatic animals would be killed by levee construction.

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 temporary dislocation of the fisheries resource. Fish species would relocate to other adjacent aquatic habitat. Slow moving species would be killed.

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, brackish, and saline 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 postlarval 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.

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.

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.

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 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 immediate vicinity of the proposed project.

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--silt fences and hay bales) would be used to reduce suspended solids from runoff. Turbidity screens or silt curtains placed in water around construction sites would reduce the spread of waters with elevated concentrations of suspended solids. 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.

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.

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.

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.

RECREATION

Alternative A

6.128 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

6.129 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

6.130 Cultural resources reconnaissance for this project area was conducted by New South Associates and URS under contract with the Corps, between 12 August 2008 and 15 September 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.

6.131 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.

6.132 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

6.133 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)

6.134 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 13 April 2010 (Appendix G). The SHPO concurred with USACE eligibility determinations and finding of no adverse effect in a letter dated 11 May 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 4 May 2010 (Appendix G) concurring with the USACE finding of no adverse effect, and the Choctaw Nation of Oklahoma by letter dated 15 June 2010 (Appendix G) concurring with the USACE finding of no adverse effect.

Alternative C

6.135 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

6.136 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

6.137 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.

6.138 The direct and indirect impacts of the action levee alternatives would be extremely 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

6.139 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.

6.140 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

6.141 Information for the discussion 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.

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

6.143 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

6.144 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 CEMVN Regulatory Branch 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.

6.145 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

6.146 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.

6.147 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.

6.148 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
910 Bayou Road	Bernard	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	85
West Bank I	Jefferson	9.76	4.64
Churchill Farms, Pit A	Jefferson	29.9	10.62
Stumpf - Phase 1	Orleans	318	88
Stumpf - Phase 2	Orleans	519	143
Maynard	Orleans	44	14.65
Cummings North	Orleans	182	54.14
Westbank Site G	Orleans	82	45.52
Belle Chasse	Plaquemines	8	3.68
Bazile	Plaquemines	11.6	3.93
Triumph East	Plaquemines	0	0

TABLE 6-8 (Cont)

Proposed Borrow	Parish	Area Parish Bottom-Land Hardwoods Impacted	AAHUs Needed (acres)
Bonnet Carre South	Plaquemines	0	0
Bonnet Carre North - Phase 2	Plaquemines	0	0
Brad Buras	Plaquemines	(9, nonbottom-land hardwoods)	0
Westbank N	Plaquemines	0	0
Tabony	Plaquemines	86.93	28.9
Tac Carrere	Plaquemines	17.1	12.1
1418/1420 Bayou Rd.	St. Bernard	13	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**

6.149 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

6.150 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.

6.151 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

6.152 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

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

Wildlife

6.154 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.

6.155 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

6.156 Use of the proposed Government-furnished borrow sources is not likely to adversely affect T&E species or their critical habitats. The endangered brown pelican may be present in the vicinity of some borrow locations. However, none were observed at the borrow areas described in this document. The 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

6.157 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.

6.158 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

6.159 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

6.160 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. Abrupt changes in grade shall be avoided, and the bottom of the borrow pit shall be left relatively smooth and sloped from one end to the other. Any excavation below the depths and slopes specified shall be backfilled to the specified permissible excavation line in accordance with construction plans and specifications. Abrupt changes in borrow area alignment shall be avoided. With the use of BMPs, direct and indirect disturbance of water quality would be temporary, confined, and short lived.

Esthetic (Visual) Resources

6.161 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

6.162 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

6.163 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. A transportation analysis for use of borrow for the modification and replacement of the Plaquemines Parish NFL is included in Section 6 of this document.

HTRW

6.164 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

6.165 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.

6.166 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.

6.167 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.

6.168 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.

6.169 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.

6.170 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

6.171 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

6.172 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.

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

Natural Resources

6.173 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

6.174 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.

6.175 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

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

6.177 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.

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 Missisippi 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

Reasonably Foreseeable Future Actions

6.178 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.

Incremental Effects of Proposed Project

6.179 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

6.180 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).

6.181 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

6.182 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.

6.183 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.

6.184 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

6.185 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.

6.186 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

6.187 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.

6.188 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

6.189 No-Action Alternative is not expected to have a 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

6.190 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.

Indirect Impacts

6.191 **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.

6.192 **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

6.193 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.

6.194 **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.

6.195 **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

6.196 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

6.197 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.

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.

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

6.198 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.

6.199 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.

SECTION 7

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7. LIST OF PREPARERS/CONTRIBUTORS

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SECTION 8

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APPENDIX A
PLANNING AID LETTER

United States Department of the Interior

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

March 31, 2009

Colonel Alvin B. Lee
U.S. Army Corps of Engineers
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Lee:

The U.S. Fish and Wildlife Service (Service) has preliminarily reviewed the hurricane protection levee alignments being investigated under the New Orleans to Venice, LA, Hurricane Protection Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana. The purpose of that project is to modify certain non-Federal levees in Plaquemines Parish to provide improved storm surge protection and to protect evacuation routes. The study area encompasses forested wetlands, wet pasture, marsh and open water habitats on the west side of the Mississippi River between Oakville, Louisiana and near St. Jude, Louisiana. The following comments are provided on a planning-aid basis to assist in a preliminary screening of alternative alignments and do not constitute the final report of the Secretary of Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Service submits the following comments in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969, as amended, and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 661 et seq.).

General Comments

As indicated in our March 20, 2007, letter commenting on the Notice of Intent, we strongly recommend investigation of alternatives which avoid and minimize impacts to wetlands. In instances where existing levee footprints are to be enlarged, the study should investigate design alternatives which increase levee footprints toward the protected side to avoid impacts to wetlands outside of the protected system. Where appropriate, existing levees located outside of new levee alignments should be appropriately gapped to facilitate restoration of habitat and other functional values in hydrologically degraded or former wetlands. In addition, the enclosure of large wetland tracts should be avoided to the greatest degree practicable. Borrow areas should be located within the protected side of the system and preferably within existing agricultural lands and non-wet pasture areas.

Additionally, the Corps should ensure that any proposed alignments are compatible with the coastal restoration strategies identified in the 1993 Louisiana Coastal Wetlands Restoration Plan, the Coast 2050 Plan (both of which were developed in accordance with the Coastal Wetlands Planning, Protection and Restoration Act [CWPPRA]), Louisiana's Comprehensive Master Plan

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for a Sustainable Coast (State Master Plan), as well as the keystone strategies developed for the Louisiana Coastal Area Comprehensive Coastwide Feasibility Study (LCA) and the Louisiana Coastal Protection and Restoration Project (LACPR). Specifically, the West Pointe a la Hache Outfall Management Project, funded under CWPPRA, proposes to optimize the operation of the West Pointe a la Hache Siphons to divert water and sediment from the Mississippi River into portions of the study area. Section 303(d) of the CWPPRA requires the Secretary of the Army, in consultation with the Director of the Service and the Administrator of the Environmental Protection Agency (EPA), to ensure that Corps projects are consistent with the purposes of restoration plans prepared in compliance with Section 303(b) of CWPPRA. Furthermore, a diversion near Myrtle Grove, Louisiana is also a key component of plans being considered under the LCA Study and the LACPR Project. The proposed diversion would divert water from the Mississippi River into wetlands west of the proposed alignments. We recommend that the Corps fully assess the consistency of any proposed alignments with the restoration measures that have been previously identified under CWPPRA, LCA, State Master Plan, and LACPR.

Since the February 16, 2007, Notice of Intent, several alternative alignments have been developed, modified, and reviewed within each of the five study sections. We provide the following specific comments for each alignment section. Please be aware, our comments are based on draft direct impact and enclosed wetland impact figures (attached) provided to us by your staff. A detailed impact analysis has not been performed on the alternative alignments as no final wetland impact figures have been provided to us for a selected plan, however, potential acreage impacts for each alternative are presented in Table 1.

Specific Comments

Section 1 – Within Section 1 (Plate 1), Alignments 1A and 1C would result in the lowest degree of wetland impacts and would be preferred by the Service. Alignment 1 would be the least preferred alternative as it would directly impact the highest acreage of coastal marsh and enclose several hundred acres of bottomland hardwoods. Regardless of the alignment selected, it should not jeopardize operation of the freshwater diversion siphons (i.e., Naomi Siphons) located near La Reussite.

Section 2 – Within Section 2 (Plate 2), Alignment 2D would result in the lowest acreage of wetland impacts and would be preferred by the Service, followed by alignments 2A1, 2B, and 2A. Alignments 2, 2C, and 2E result in impacts which appear to be limited to wet pasture and avoid impacts to coastal marsh and wet bottomland hardwoods. Alignment 2E would be the least preferred as it would result in the highest degree of wetland impacts.

Section 3 – Within Section 3 (Plate 3), Alignment 3B results in the lowest degree of wetland impacts and would be preferred by the Service. Alignments 3 and 3A would impact greater acreages of coastal marsh and wet bottomland hardwoods.

Section 4 – Within Section 4 (Plate 4), Alignments 4A and 4B would be preferred as they avoid nearly all wetland impacts. The other alignments would result in significant wetland impacts and would not be preferred.

Section 5 – Within Section 5 (Plate 5), Alignment 5A would be the preferred alternative as it would result in the lowest amount of wetland impacts. Although Alignment 5A would result in the greatest amount of acres impacted, the impacts are primarily within scrub-shrub habitat and impacts to coastal marsh are avoided.

We are especially concerned with the recent addition of Alignment 5C which would directly impact 137 acres of coastal marsh and enclose an additional 1,500 acres of coastal marsh habitats. Apparently, Alignment 5C is being investigated because it would provide a potential site for the Louisiana Millennium Port. Should Alignment 5C be selected on the premise that it would then provide a site for the Louisiana Millennium Port, then mitigation would be required for all enclosed wetlands, in addition to directly impacted wetlands. Furthermore, as currently depicted, Alignment 5C would no longer allow operation of the West Pointe a la Hache Siphons which have been in operation since the early 1990s and provide much needed fresh water, sediments, and nutrients to coastal marshes west of the alignment. In addition, CWPPRA has funded engineering and design work to optimize operation of the siphons to increase wetland benefits within the outfall area. That project, the West Pointe a la Hache Outfall Management Project, would enhance nearly 16,000 acres of coastal wetlands and result in the net creation/protection of 646 acres over the project life. For those reasons, Alignment 5C would not be supported by the Service.

We look forward to working closely with the Corps during preparation of the SEIS. If you have any questions regarding our comments, please contact Kevin Roy at 337/291-3120.

Sincerely,

James F. Boggs
Field Supervisor
Louisiana Field Office

cc: U.S. Army Corps of Engineers, Vicksburg, MS
Environmental Protection Agency, Dallas, TX
National Marine Fisheries Service, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources, Baton Rouge, LA

Table 1. Direct Impacts by Habitat Type and Alignment

Alignment	Habitat Type	Habitat Acres
1 (Existing)	Bottomland Hardwood Dry	97.16
1 (Existing)	Bottomland Hardwood Wet	78.03
1 (Existing)	Marsh	77.31
1 (Existing)	Swamp	6.79
1A	Bottomland Hardwood Dry	0.08
1A	Bottomland Hardwood Wet	76.66
1A	Marsh	77.32
1B	Bottomland Hardwood Dry	37.90
1B	Bottomland Hardwood Wet	77.54
1B	Marsh	77.33
1B	Swamp	14.70
1C	Bottomland Hardwood Dry	0.24
1C	Bottomland Hardwood Wet	77.16
1C	Marsh	77.38
2 (Existing)	Wet Pasture	61.00
2A	Bottomland Hardwood Dry	33.38
2A1	Bottomland Hardwood Dry	23.53
2B	Bottomland Hardwood Dry	28.28
2C	Wet Pasture	61.16
2D	Bottomland Hardwood Wet	2.30
2D	Wet Pasture	6.94
2E	Bottomland Hardwood Wet	0.32
2E	Wet Pasture	84.39
3 (Existing)	Bottomland Hardwood Wet	20.49
3 (Existing)	Marsh	12.68
3A	Bottomland Hardwood Wet	20.49
3A	Marsh	12.68
3B	Bottomland Hardwood Wet	14.49
3B	Marsh	8.58
4 (Existing)	Subsided Ridge	58.55
4 (Existing)	Wet Pasture	108.24
4A	Bottomland Hardwood Wet	0.42
4B	Wet Pasture	0.02
4C	Subsided Ridge	67.27
4C	Wet Pasture	24.51
4D	Subsided Ridge	58.64
4D	Wet Pasture	26.19
4E	Wet Pasture	155.68
5 (Existing)	Coastal Marsh	28.77
5 (Existing)	Scrub-Shrub	3.23
5A	Bottomland Hardwood Dry	14.38
5A	Scrub-Shrub	59.23
5B	Coastal Marsh	2.05
5B	Scrub-Shrub	38.73
5C	Scrub-Shrub	1.38
5C	Coastal Marsh	137.24

Total Impacts by Alignment

Alignment	Habitat Acres
1 (Existing)	259.30
1A	154.06
1B	207.47
1C	154.77
2 (Existing)	61.00
2A	33.38
2A1	23.53
2B	28.28
2C	61.16
2D	9.24
2E	84.71
3 (Existing)	33.16
3A	33.16
3B	23.07
4 (Existing)	166.79
4A	0.42
4B	0.02
4C	91.78
4D	84.82
4E	155.68
5 (Existing)	32.00
5A	73.61
5B	40.77
5C	138.62

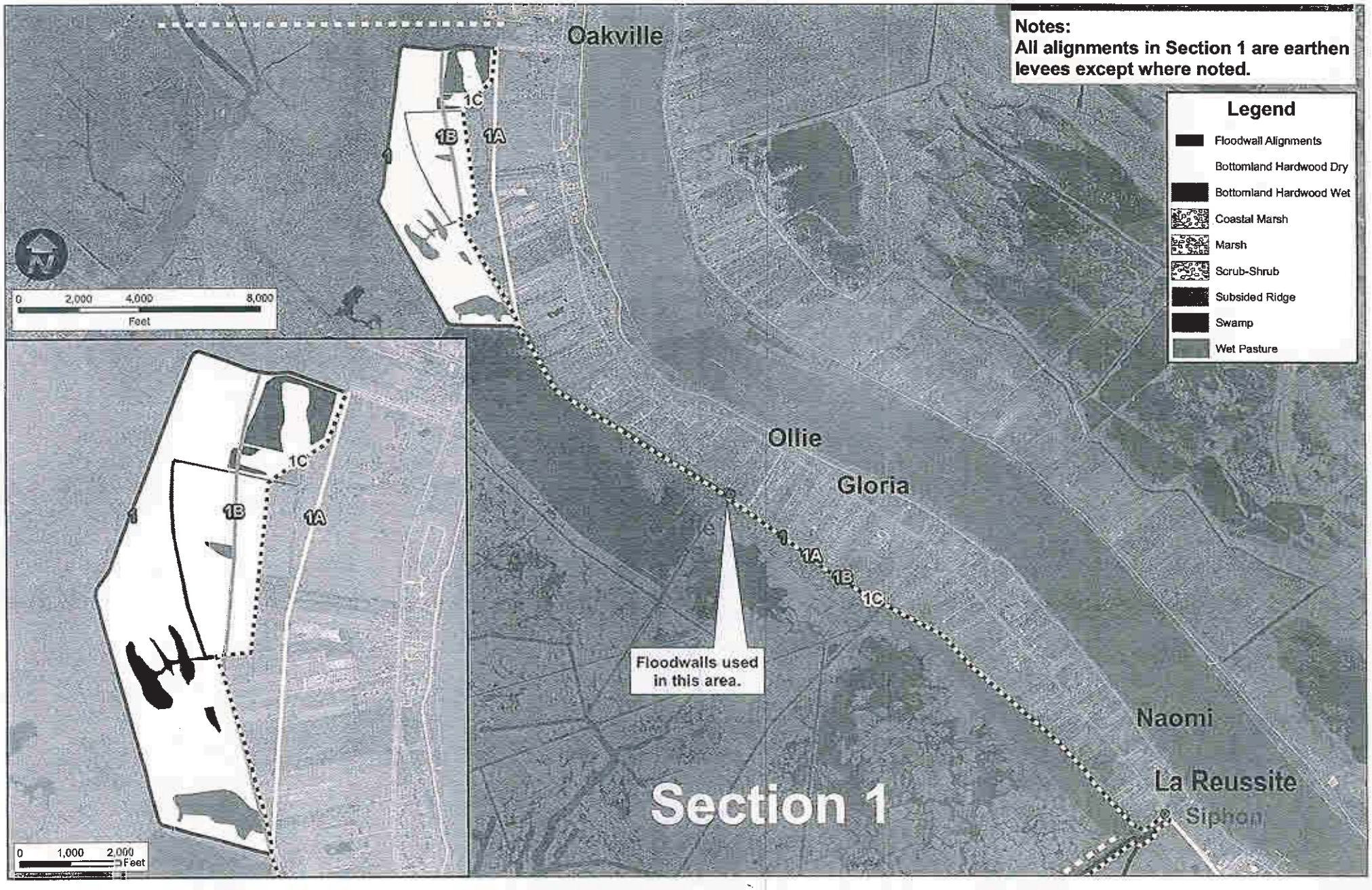
Notes:
All alignments in Section 1 are earthen levees except where noted.
Legend
Floodwall Alignments
Bottomland Hardwood Dry
Bottomland Hardwood Wet
Coastal Marsh
Marsh
Scrub-Shrub
Subsided Ridge
Swamp
Wet Pasture
Oakville
Ollie
Gloria
Naomi
La Reussite
Siphon
Section 1
Floodwalls used in this area.
1
1A
1B
1C
0 2,000 4,000 8,000
Feet
0 1,000 2,000
Feet

Plate 1

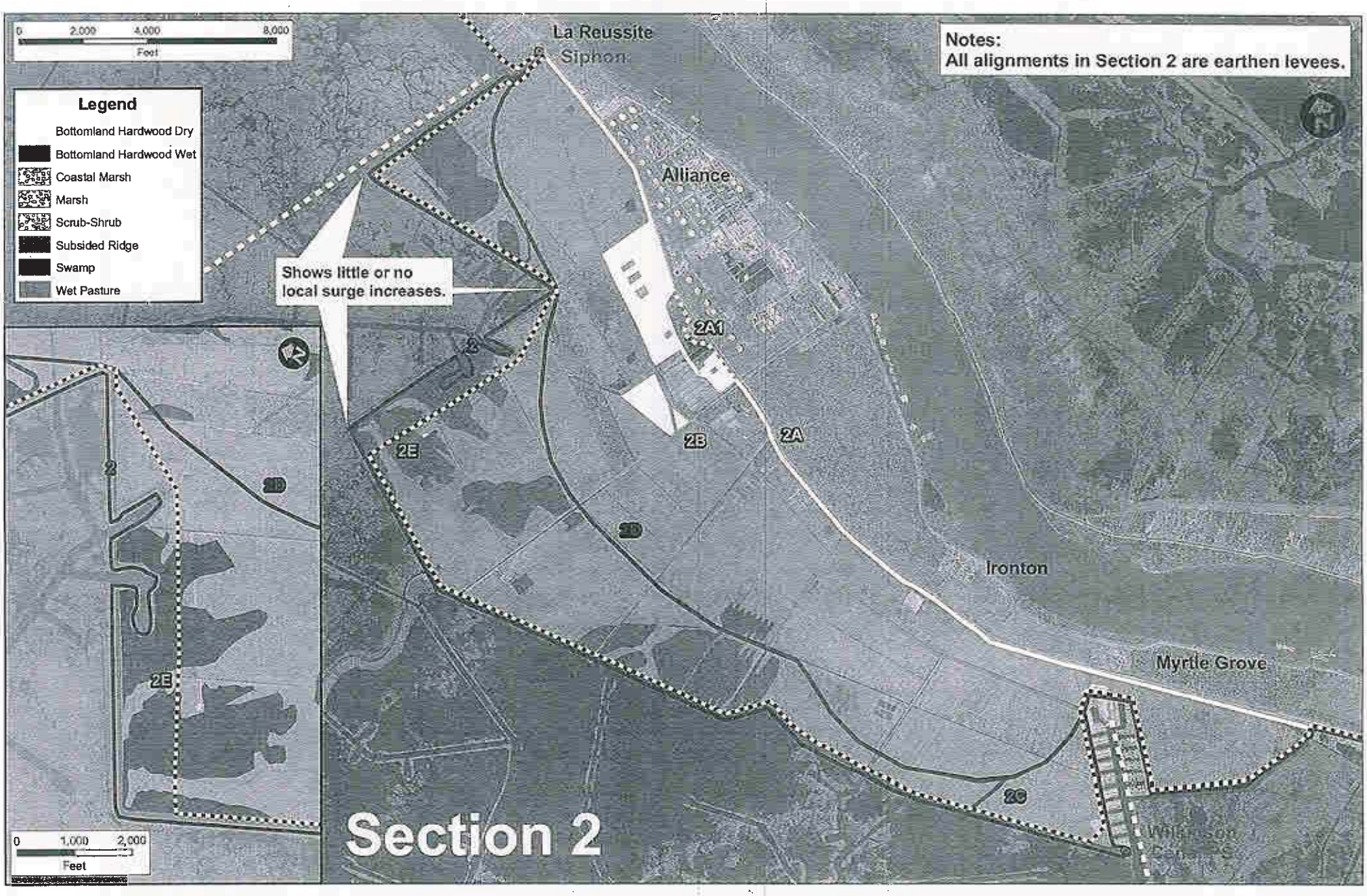
0 2,000 4,000 8,000
Feet
Legend
Bottomland Hardwood Dry
Bottomland Hardwood Wet
Coastal Marsh
Marsh
Scrub-Shrub
Subsided Ridge
Swamp
Wet Pasture
La Reussite
Siphon
Notes:
All alignments in Section 2 are earthen levees.
Alliance
Shows little or no
local surge increases.
2A1
2A
2B
2E
2D
2C
Ironton
Myrtle Grove
Section 2
0 1,000 2,000
Feet

Plate 2

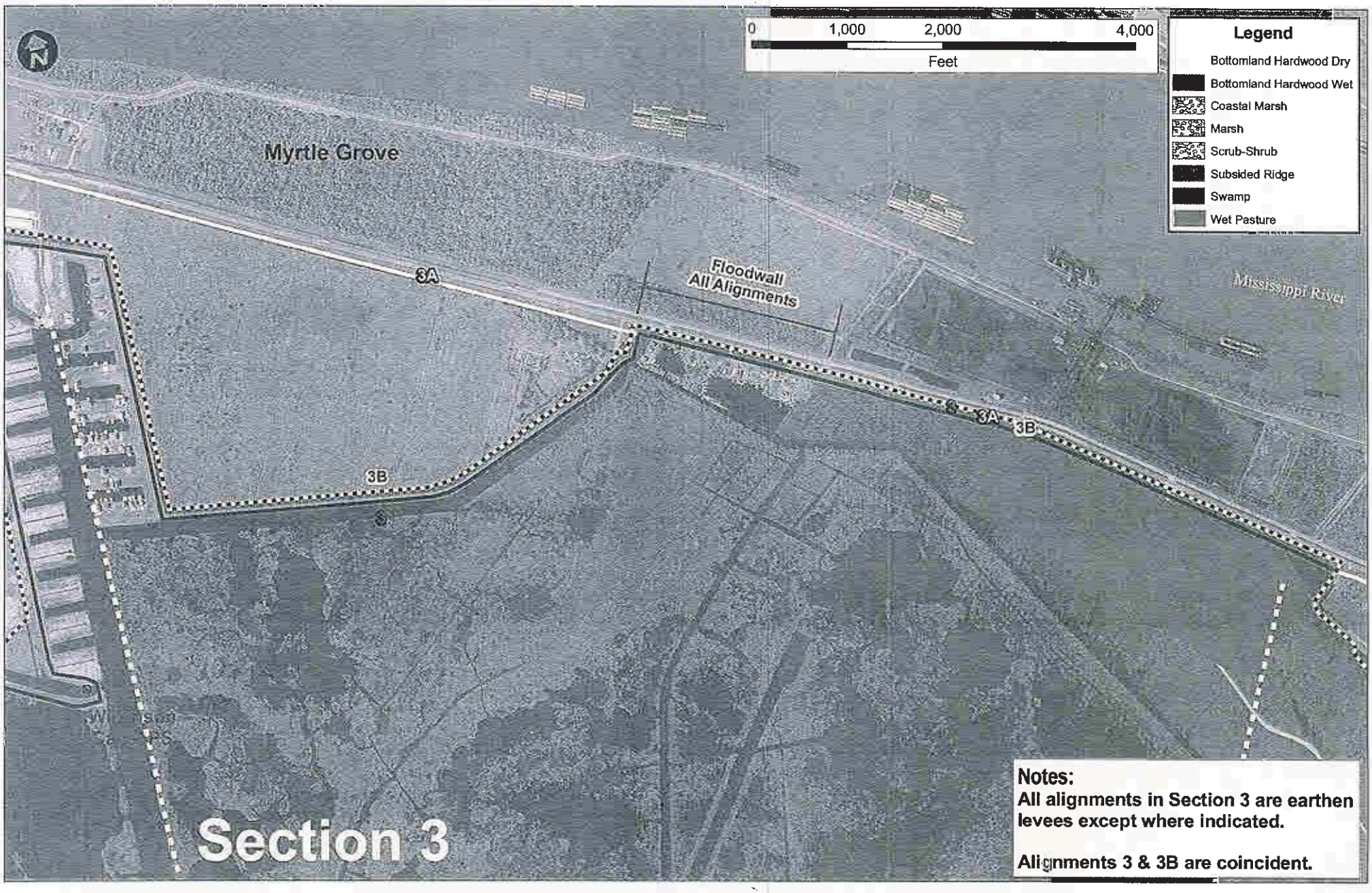
0
1,000
2,000
4,000
Feet
Legend
Bottomland Hardwood Dry
Bottomland Hardwood Wet
Coastal Marsh
Marsh
Scrub-Shrub
Subsided Ridge
Swamp
Wet Pasture
Myrtle Grove
3A
3B
Floodwall
All Alignments
Mississippi River
Section 3
Notes:
All alignments in Section 3 are earthen levees except where indicated.
Alignments 3 & 3B are coincident.

Plate 3

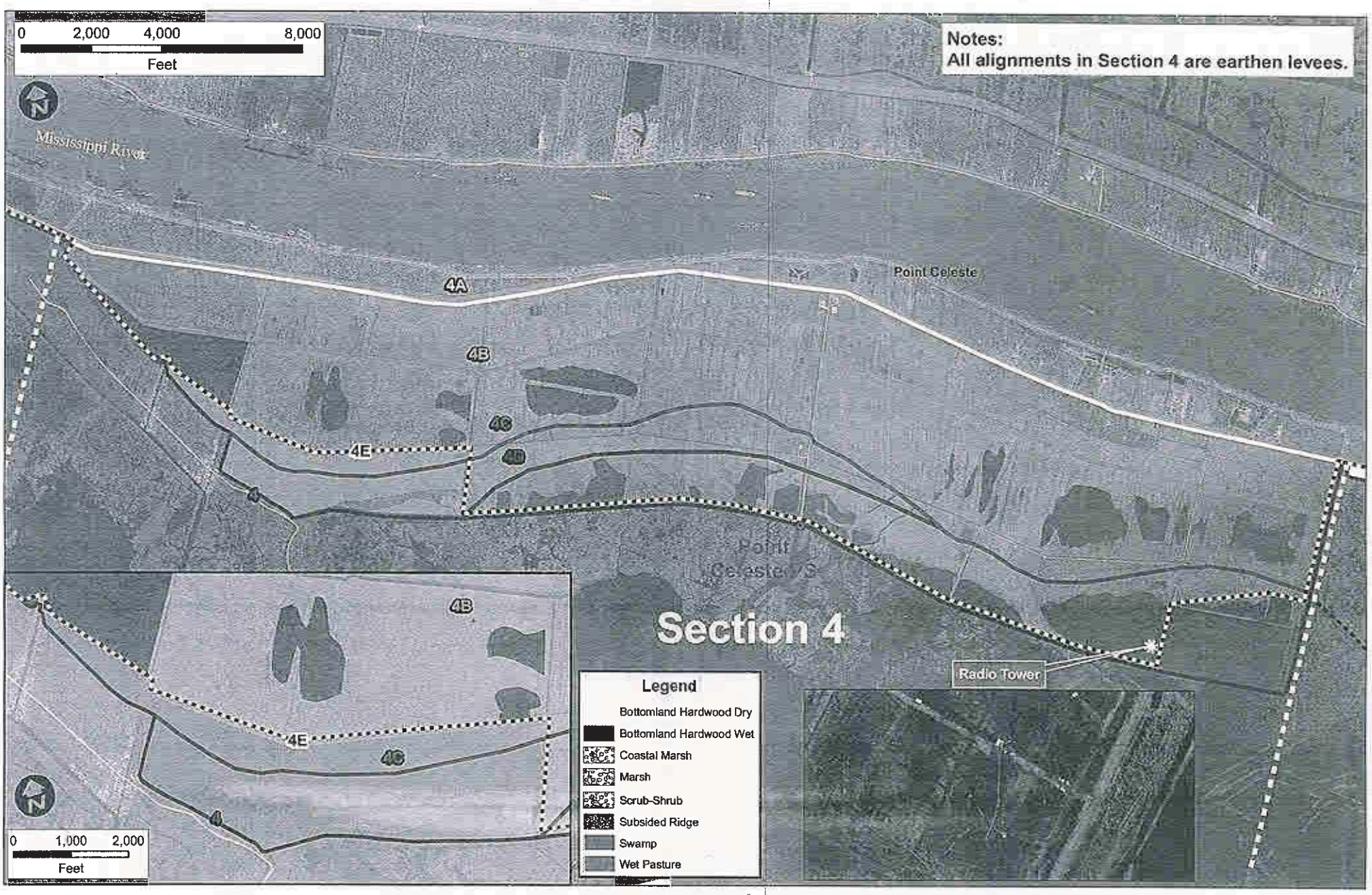
0 2,000 4,000 8,000
Feet
Notes:
All alignments in Section 4 are earthen levees.
Mississippi River
Point Celeste
4A
4B
4C
4D
4E
4
Point Celeste VS
Section 4
Radio Tower
Legend
Bottomland Hardwood Dry
Bottomland Hardwood Wet
Coastal Marsh
Marsh
Scrub-Shrub
Subsided Ridge
Swamp
Wet Pasture
0 1,000 2,000
Feet

Plate 4

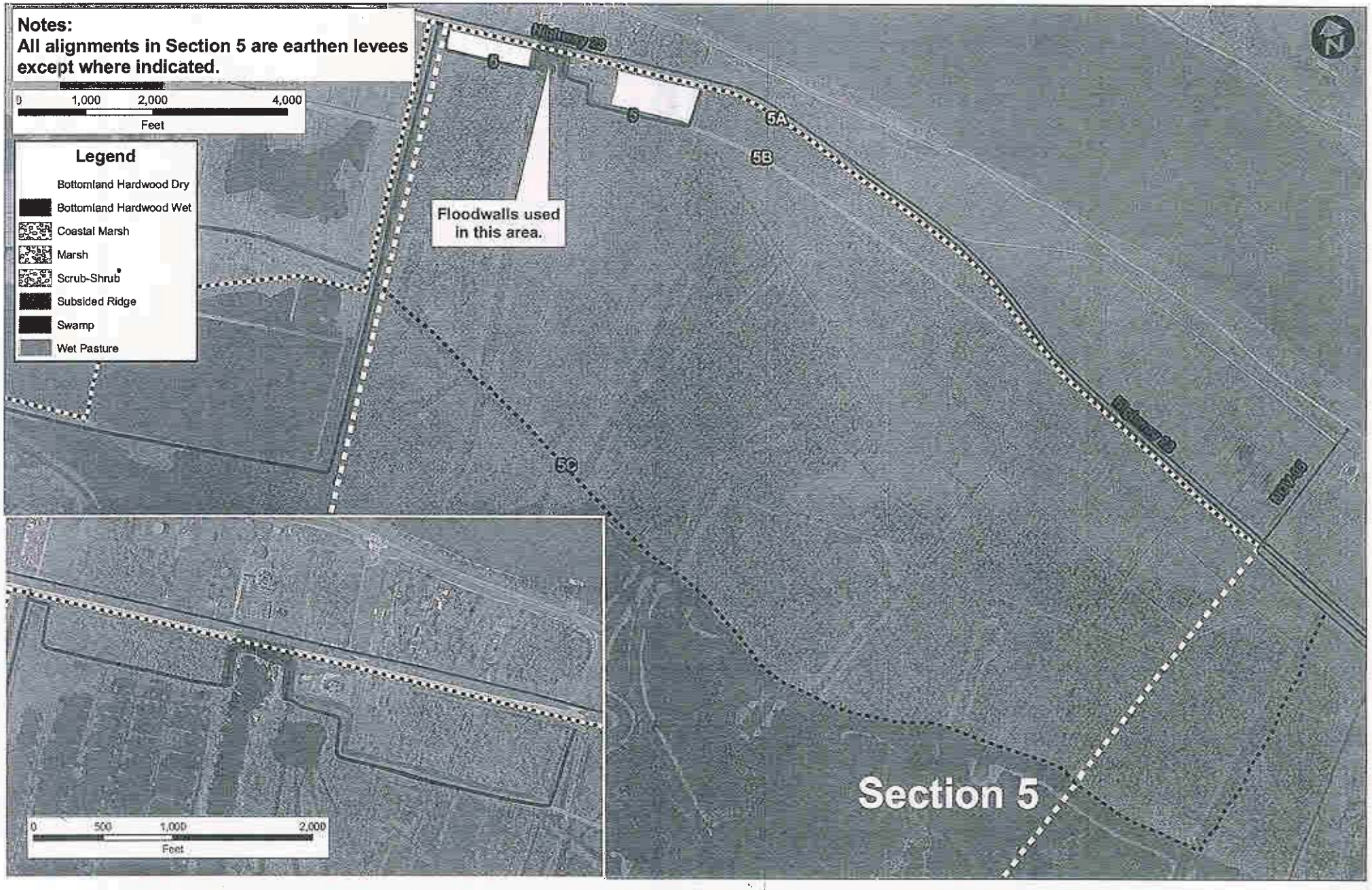
Notes:
All alignments in Section 5 are earthen levees except where indicated.
0 1,000 2,000 4,000
Feet
Legend
Bottomland Hardwood Dry
Bottomland Hardwood Wet
Coastal Marsh
Marsh
Scrub-Shrub
Subsided Ridge
Swamp
Wet Pasture
Highway 23
5
5
5A
5B
5C
Floodwalls used in this area.
Section 5
0 500 1,000 2,000
Feet

Plate 5

APPENDIX B
FISH AND WILDLIFE COORDINATION ACT REPORT

United States Department of the Interior

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

December 20, 2010

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

Dear Colonel Fleming:

Enclosed is the draft Fish and Wildlife Coordination Act Report for the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) – Incorporation of Nonfederal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana (NFL), project. This draft report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). It is concurrently being coordinated with the Louisiana Department of Wildlife and Fisheries and National Marine Fisheries Service, whose comments will be incorporated into the final report.

Should your staff have any questions regarding the enclosed report, please have them contact Ms. Brigette Firmin of this office at 337/291-3108.

Sincerely,

for James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

cc: EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Baton Rouge, LA
LDNR, CMD, Baton Rouge, LA
OCPR, Baton Rouge, LA

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United States Department of the Interior

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

December 20, 2010

Mr. Richard Hartman
National Marine Fisheries Service
Rm 266 Military Science Building
South Stadium Drive, LSU
Baton Rouge, Louisiana 70803

Dear Mr. Hartman:

Enclosed is the draft Fish and Wildlife Coordination Act Report for the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) – Incorporation of Nonfederal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana (NFL), project. This draft report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). Any comments that you provide on behalf of the National Marine Fisheries Service will be incorporated into the final report.

Should your staff have any questions regarding the enclosed report, please have them contact Ms. Brigette Firmin of this office at 337/291-3108.

Sincerely,

for James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

TAKE PRIDE IN AMERICA

United States Department of the Interior

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

December 20, 2010

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

Dear Mr. Barham:

Enclosed is the draft Fish and Wildlife Coordination Act Report for the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) – Incorporation of Nonfederal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana (NFL), project. This draft report is transmitted under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). Any comments that you provide on behalf of the Louisiana Department of Wildlife and Fisheries will be incorporated into the final report.

Should your staff have any questions regarding the enclosed report, please have them contact Ms. Brigette Firmin of this office at 337/291-3108.

Sincerely,

for James F. Boggs
Supervisor
Louisiana Field Office

Enclosures

TAKE PRIDE IN AMERICA

DRAFT
Fish and Wildlife Coordination Act Report

New Orleans to Venice, LA, Hurricane Protection Project: Incorporation of Nonfederal Levees from Oakville to St. Jude Plaquemines Parish, Louisiana

Provided to:
U.S. Army Corps of Engineers
Vicksburg, Louisiana

Prepared by:
Brigette D. Firmin
Fish and Wildlife Biologist
Ecological Services
Lafayette, Louisiana

U.S. Fish and Wildlife Service
Southeast Region
Atlanta, Georgia

December 2010

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EXECUTIVE SUMMARY

The U.S. Fish and Wildlife Service (Service) has prepared this draft Fish and Wildlife Coordination Act Report for the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) – Incorporation of Nonfederal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana (NFL), under the authority of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). The U.S. Army Corps of Engineers, Vicksburg District (Corps) is preparing an Environmental Impact Statement (EIS) to fulfill the Corps' compliance with the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.). Work proposed in that EIS would be conducted under the authority of Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (Supplemental 4). That law authorized the Corps to upgrade and incorporate certain nonfederal levees into the existing NOV project in Plaquemines Parish, Louisiana.

This report contains a description of the existing fish and wildlife resources of the project area, discusses future with- and without-project habitat conditions, identifies fish and wildlife-related impacts of the proposed project, and provides recommendations for the proposed project. This draft report incorporates and supplements the November 26, 2007, Draft Programmatic FWCA Report that addresses the hurricane protection improvements authorized in Supplemental 4. Impacts and mitigation needs resulting from government and contractor provided borrow areas have been addressed in the October 25, 2007, and November 1, 2007, FWCA Reports, respectively; therefore, this report will not address those project features. This draft document does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. This draft report has been provided to the Louisiana Department of Wildlife and Fisheries (LDWF) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS); their comments will be incorporated in the final report.

The NFL study area is located within the Barataria Basin of the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. It is defined by the Mississippi River to the east; forested and emergent wetlands to the west; a forested and emergent marsh complex and the town of Oakville, Louisiana, to the north; and the NOV hurricane protection system, emergent marsh, and the town of Magnolia, Louisiana, to the south. Within the NFL hurricane protection system, natural levees and lower lying wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development; however, a majority of the land remains undeveloped. Undeveloped lands generally consist of bottomland hardwood and scrub-shrub habitats.

Study area wetlands support nationally important fish and wildlife resources including fresh marsh and cypress swamp. Factors that will strongly influence future fish and wildlife resource conditions outside of the protection levees include freshwater and sediment input and loss of coastal wetlands. Regardless of which of the above factors ultimately has the greatest influence, emergent wetlands within and adjacent to the project area will likely experience losses due to subsidence, erosion, and relative sea-level rise.

During the alternatives analysis, the no-action alternative and the alternative to improve the existing hurricane protection levee system to provide a 100-year level of protection were considered. The no-action alternative would not be implemented because it fails to provide the authorized level of protection from Oakville to St. Jude, Louisiana. The alternative to improve the existing levee system to provide a 100-year level of protection would not be implemented because it exceeds the Corps' allocated cost for construction; however, the local sponsor has the option to implement a 100-year level of protection by funding the excess costs beyond the Corps' preferred alternative.

The Corps' preferred alternative would include raising the existing hurricane protection levee system to provide a 50-year level of protection. The proposed levee improvements would be incorporated into 32 miles of existing levee system and approximately 2 miles of new levee would be constructed. Levee heights would be raised to elevations varying from 7.5 feet up to 13 feet North American Vertical Datum (NAVD) along different sections of the existing system.

Implementation of the preferred alternative would directly impact 46.05 acres of hydrologically altered (i.e., non-wet) bottomland hardwood habitat, 97.6 acres of wet bottomland hardwood habitat, 24.87 acres of swamp habitat, 10.36 acres of fresh marsh habitat, 0.05-acre of intermediate marsh habitat, 16.11 acres of brackish marsh habitat, and 144.94 acres of wetland pasture. According to the Gulf South Research Corporation's (GSRC) Habitat Assessment Methodology (HAM), Wetland Value Assessment (WVA), and Habitat Evaluation System (HES) analyses the preferred alternative would result in the direct loss of 29.23 average annual habitat units (AAHUs) of hydrologically altered bottomland hardwood forest, 68.65 AAHUs of wet bottomland hardwood forest, 21.13 AAHUs of swamp, 6.84 AAHUs of fresh marsh, 8.92 AAHUs of brackish marsh (includes impacts to intermediate marsh due to small scale and location), and 50.62 AAHUs of wetland pasture. Mitigation for unavoidable losses of those habitats caused by project features should be implemented concurrent with project construction.

The Service does not object to providing improved hurricane protection 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 non-wet bottomland hardwoods are avoided or minimized.

2. The Corps shall fully compensate for any unavoidable losses to wet and non-wet 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 enclosed in Appendix A.

3. Minimize enclosure of wetlands with new and/or expanded levee alignments. When enclosing wetlands is unavoidable, acquire non-development easements on those

wetlands, or maintain hydrologic connections with adjacent, un-enclosed wetlands to minimize secondary impacts from development and hydrologic alteration.

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

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., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

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 non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

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 on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

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.

9. Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

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 the Service 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.

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.

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

13. A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the Corps, the Service, NMFS, the Environmental Protection Agency, the Louisiana Department of Natural Resources, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

INTRODUCTION

The New Orleans to Venice Hurricane Protection (NOV) Project provides hurricane protection to developed areas of Plaquemines Parish, Louisiana, along the Mississippi River below New Orleans. In coordination with the U.S. Army Corps of Engineers' (Corps) New Orleans District and the Louisiana Office of Coastal Planning and Restoration (OCPR, the nonfederal sponsor), the Corps' Vicksburg District is preparing an Environmental Impact Statement (EIS) for the proposed incorporation of the nonfederal levees from Oakville to St. Jude (NFL), in Plaquemines Parish, Louisiana, into the existing NOV federal levee system. The nonfederal levees would be improved to provide a 50-year level of protection in accordance with Public Law 109-234, Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery 2006 (Supplemental 4).

The U.S. Fish and Wildlife Service (Service) has prepared this draft FWCA report in accordance with provisions of the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 United States Code (U.S.C.) 661 et seq.). This draft FWCA report contains a description of the existing fish and wildlife resources in the project area and a discussion of the future with- and without-project conditions. This report also identifies fish and wildlife-related impacts and provides recommendations for the proposed project. This report incorporates and supplements our November 26, 2007, draft programmatic FWCA report that addresses the hurricane protection improvements authorized in Supplemental 4. This draft report does not constitute the report of the Secretary of the Interior as required by Section 2(b) of the FWCA. It is being reviewed by the Louisiana Department of Wildlife and Fisheries (LDWF) and the National Marine Fisheries Service (NMFS), and their comments on this draft report will be incorporated into the final report.

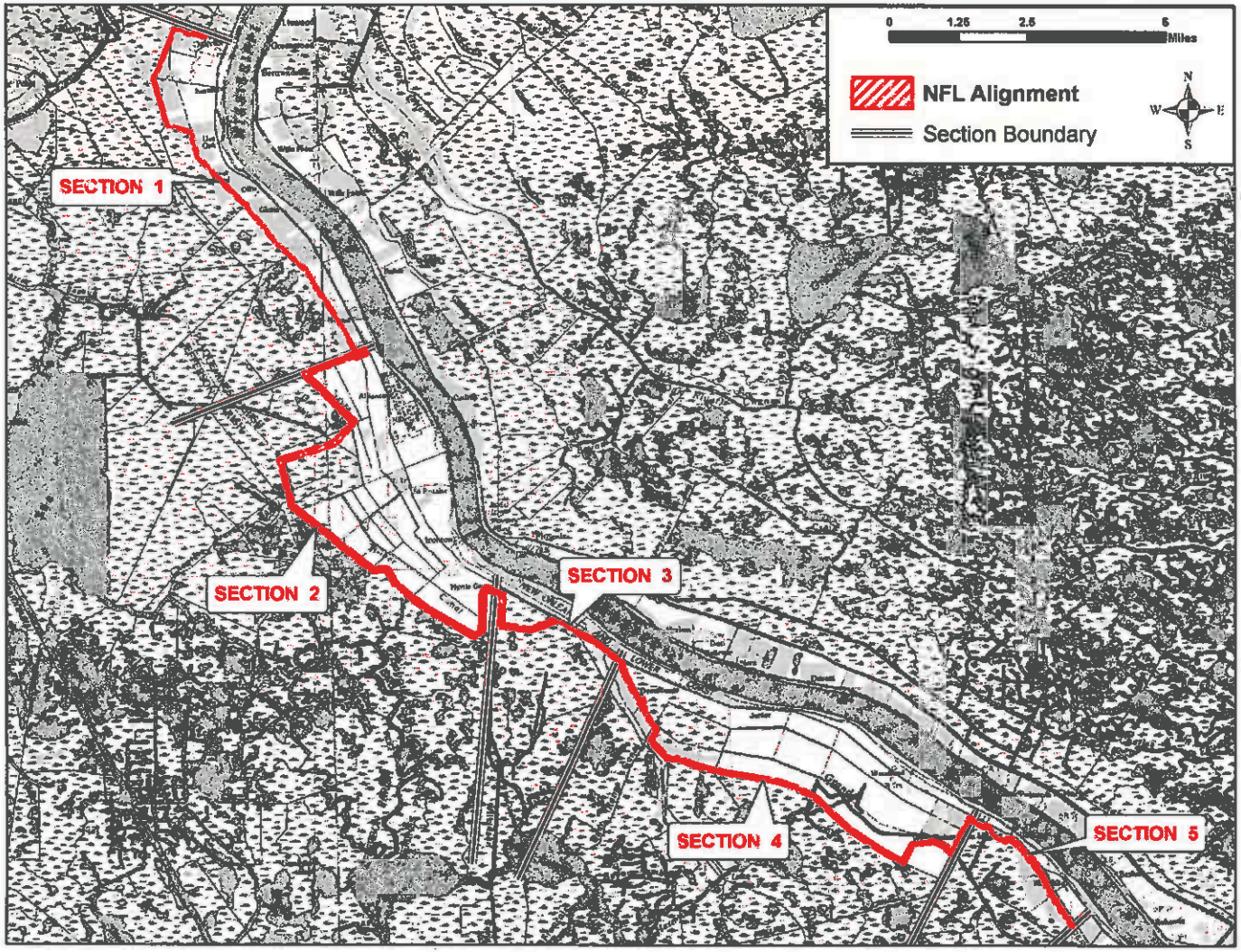
Project Description

The goal of the proposed action is to improve the storm damage reduction capability of the NFL system in Plaquemines Parish, Louisiana (Figure 1). The proposed action would involve upgrading the elevation of approximately 32 miles of the existing NFL system and constructing 2 miles of new earthen levee in Section 2. The proposed action would result in a wider levee footprint along the existing alignment and a new alignment for 2 miles in Section 2.

DESCRIPTION OF THE STUDY AREA

The NFL study area is located within the Barataria Basin of the Mississippi River Deltaic Plain of the Lower Mississippi River Ecosystem. It is defined by the Mississippi River to the east; forested and emergent wetlands to the west; a forested and emergent marsh complex and the town of Oakville, Louisiana, to the north; and the NOV hurricane protection system, emergent marsh, and the town of Magnolia, Louisiana, to the south. Within the NFL hurricane protection system, natural levees and lower lying wetlands have been leveed and drained to accommodate residential, commercial, and agricultural development; however, a majority of the land remains undeveloped. Undeveloped lands generally consist of bottomland hardwood and scrub-shrub habitats.

Figure 1. New Orleans to Venice – Incorporation of Nonfederal Levees, Plaquemines Parish, Louisiana, (NFL) Study Area.



Description of Habitats

The major habitat types in the study area can be classified as estuarine emergent marsh, estuarine scrub-shrub wetlands, palustrine forested wetlands, wetland pasture, open water, and developed upland. Due to development and a forced-drainage system, the hydrology of the forested habitat within the Plaquemines Parish hurricane protection system has been altered. The forced-drainage system has been in operation for many years, and subsidence is evident throughout the areas enclosed by levees.

The coastal wetlands within the study area provide plant detritus to adjacent coastal waters and thereby contribute to the production of commercially and recreationally important fishes and shellfishes. Wetlands in the project area also provide valuable water quality functions such as reduction of excessive dissolved nutrient levels, filtering of waterborne contaminants, and removal of suspended sediment. In addition, coastal wetlands buffer storm surges reducing their damaging effect to man-made infrastructure within the coastal area.

Factors that will strongly influence future fish and wildlife resource conditions outside of the protection levees include freshwater input and loss of coastal wetlands. Depending upon the deterioration rate of marshes, the frequency of occasional short-term saltwater events may increase. Under that scenario, tidal action in the project area may increase gradually as the buffering effect of marshes is lost, and use of that area by estuarine-dependent fishes and shellfish tolerant of saltwater conditions would likely increase. Regardless of which of the above factors ultimately has the greatest influence, freshwater wetlands within and adjacent to the project area will probably experience losses due to development, subsidence, and erosion.

The ongoing loss of coastal Louisiana wetlands (approximately 1,149 square miles between 1956 and 2004; average loss rate of 24 square miles per year) was recently exacerbated by Hurricanes Katrina and Rita in 2005. Those hurricanes caused an initial loss of wetlands equivalent to 9 years (approximately 217 square miles) of mean annual losses. Louisiana wetlands provide 26 percent of the seafood landed in the conterminous United States and over 5 million migratory waterfowl utilize those wetlands every year. In addition, those wetlands provide protection to coastal towns, cities and their infrastructure, as well as important infrastructure for the nation's oil and gas industry.

Non-wet bottomland hardwoods within the project area also provide habitat for wildlife resources. Between 1932 and 1984, the acreage of bottomland hardwoods in Louisiana declined by 45 percent (Rudis and Birdsey 1986). A large percentage of the original bottomland hardwoods within the Mississippi River floodplain in the Deltaic Plain are located within levees. However, losses of that habitat type are not regulated or mitigated with the exception of impacts resulting from Corps projects as required by Section 906(b) of the Water Resources Development Act of 1986.

Forested Habitats

Forested habitats in the study area are divided into two major types; bottomland hardwood forests and cypress-tupelo swamps. Bottomland hardwood forests found in the study area occur

primarily on the natural levees of the Mississippi River or former distributary channels. Dominant vegetation may include sugarberry, water oak, live oak, bitter pecan, black willow, American elm, Drummond red maple, Chinese tallow-tree, box elder, green ash and elderberry. Most bottomland hardwoods that are located within the constructed hurricane protection projects have been degraded by forced drainage and resultant subsidence. Those areas are also often fragmented by development. Conversely, those bottomland hardwoods located outside the protection levees or in areas where structures through the levees maintain a hydrologic connection, still retain many wetland functions and values.

Cypress-tupelo swamps are located along the flanks of larger distributary ridges as a transition zone between bottomland hardwoods and lower-elevation marsh or scrub-shrub habitats. Cypress-tupelo swamps exist where there is little or no salinity, usually minimal daily tidal action and are usually flooded throughout most of the growing season. Bald cypress and tupelo gum are the dominant vegetation within this habitat type; however, Drummond red maple, green ash, and black willow are also common. Cypress swamps that are within the levee system and under forced drainage are often dominated by bald cypress, but vegetative species more typical of bottomland hardwoods dominate the under- and mid-story vegetation. These sites often have ecological functions closer to those of a bottomland hardwood. Because of their altered hydrology, these areas can potentially convert to sites dominated by bottomland hardwood species.

Marshes

Marsh types within the study area include fresh, intermediate, brackish, and saline. Fresh marshes occur at the upper ends of inter-distributary basins and are often characterized by floating or semi-floating organic soils and minimal daily tidal action. Vegetation may include maidencane, bulltongue, cattail, California bulrush, pennywort, giant cutgrass, American cupscale, spikerushes, bacopa, and alligatorweed. Associated open water habitats may often support extensive beds of floating-leafed and submerged aquatic vegetation including water hyacinth, *Salvinia*, duckweeds, American lotus, white water lily, water lettuce, coontail, Eurasian milfoil, hydrilla, pondweeds, naiads, fanwort, wild celery, water stargrass, elodea, and others.

Intermediate marshes are a transitional zone between fresh and brackish marshes and are often characterized by organic, semi-floating soils. Typically, intermediate marshes experience low levels of daily tidal action. Salinities are negligible or low throughout much of the year, with salinity peaks occurring during late summer and fall. Vegetation includes saltmeadow cordgrass, deer pea, three-cornered grass, cattail, bulltongue, seashore paspalum, wild millet, fall panicum, and bacopa. Ponds and lakes within the intermediate marsh zone often support extensive submerged aquatic vegetation including southern naiad, Eurasian milfoil, and wigeongrass.

Brackish marshes are characterized by low to moderate daily tidal energy and by soils ranging from firm mineral soils to organic semi-floating soils. Freshwater conditions may prevail for several months during early spring; however, low to moderate salinities occur during much of the year, with peak salinities in the late summer or fall. Vegetation is usually dominated by saltmeadow cordgrass, but also includes saltgrass, three-cornered grass, leafy three-square, and deer pea. Shallow brackish marsh ponds occasionally support abundant beds of wigeongrass.

Saline marshes occur along the fringe of the coastal wetlands. Those marshes usually exhibit fairly firm mineral soils and experience moderate to high daily tidal energy. Vegetation is dominated by saltmarsh cordgrass but may also include saltgrass, saltmeadow cordgrass, black needlerush, and leafy three-square. Submerged aquatic vegetation is rare. Within the study area, intertidal mud flats are most common in saline marshes.

Scrub-Shrub Habitats

Scrub-shrub habitat is often found along the flanks of distributary ridges and in marshes altered by spoil deposition, drainage projects, or agriculture. Typically it is bordered by marsh at lower elevations and by developed areas, cypress-tupelo swamp, or bottomland hardwoods at higher elevations. Typical scrub-shrub vegetation includes elderberry, wax myrtle, buttonbush, black willow, Drummond red maple, Chinese tallow-tree, and groundselbush. Some scrub-shrub habitat is an early successional stage of bottomland hardwood forests. Within the project area, scrub-shrub habitat occurs within abandoned agricultural fields, cattle pastures, at sites disturbed by hurricanes, or at sites experiencing subsidence.

Wetland Pasture

Wetland pasture is often found between the distributary ridges and in marshes altered by spoil deposition, drainage projects, or agriculture. Typically it is bordered by marsh at lower elevations and by active agriculture lands, scrub-shrub habitat, or residential development at higher elevations. Typical wetland pasture vegetation includes *Panicum sp.*, *Paspalum sp.*, Bermuda grass, camphorweed, marshmallow, spikerush, soft rush, dewberry, waterprimrose, smartweed, and alligator weed. Some wetland pasture consists of marsh that is used for grazing cattle. Within the project area, wetland pasture occurs along the development/marsh interface or adjacent to the existing hurricane protection system.

Open-Water Habitats

Open-water habitat within the project area consists of ponds, lakes, canals, bays, and bayous. Natural marsh ponds and lakes are typically shallow, ranging in depth from 6 inches to over 2 feet. Typically, the smaller ponds are shallow and the larger lakes and bays are deeper. In fresh and low-salinity areas, ponds and lakes may support varying amounts of submerged and/or floating-leaved aquatic vegetation. Brackish and, much less frequently, saline marsh ponds and lakes may support wigeongrass beds.

Canals and larger bayous typically range in depth from 4 or 5 feet, to over 15 feet. Strong tidal flows may occur at times through those waterways, especially where they provide hydrologic connections to other large waterbodies. Such canals and bayous may have mud or clay bottoms that range from soft to firm. Dead-end canals and small bayous are typically shallow and their bottoms may be filled in to varying degrees with semi-fluid organic material. Erosion due to wave action and boat wakes, together with shading from overhanging woody vegetation, tends to retard the amount of intertidal marsh vegetation growing along the edges of those waterways.

Drainage canals enclosed within the hurricane protection project are stagnant except when pumps are operating to remove water. Runoff from developed areas has likely reduced the habitat value of that aquatic habitat by introducing various urban pollutants, such as oil, grease, and excessive nutrients. Clearing and development has eliminated much of the riparian habitat that would normally provide shade and structure for many aquatic species.

Developed Areas

Developed habitats in the study area include residential and commercial areas, as well as roads and existing levees. Those habitats do not support significant wildlife use. Most of the development is located on higher elevations of the Mississippi River natural levees and former distributary channels. Large amounts of agricultural lands occur throughout the area; agriculture includes citrus farming, cattle production, and hay production.

Fishery/Aquatic Resources

Drainage canals in the study area do not support significant fishery resources because of dense vegetation, poor water quality, and inadequate depth. Freshwater sport fishes present in the project area, but outside of the levees, include largemouth bass, crappie, bluegill, redear sunfish, warmouth, channel catfish, and blue catfish. Other fishes likely to be present include yellow bullhead, freshwater drum, bowfin, carp, buffalo, and gar. Estuarine-dependent fishes and shellfishes such as Atlantic croaker, red drum, spot, sand seatrout, spotted seatrout, southern flounder, Gulf menhaden, striped mullet, brown shrimp, white shrimp, and blue crab are found in the intermediate to saline marshes.

Some of the waterbodies in the project area meet criteria for primary and secondary contact recreation and partially meets criteria for fish and wildlife propagation, while others do not meet the criteria for fish and wildlife propagation. Causes for not fully meeting fish and wildlife propagation criteria include excessive nutrients, organic enrichment, low dissolved oxygen levels, flow and habitat alteration, pathogens and noxious aquatic plants. Indicated sources of those problems include hydrologic modification, habitat modification, recreational activities, and unspecified upstream sources. Municipal point sources, urban runoff, storm sewers, and onsite wastewater treatment systems are also known contributors to poor water quality in the area.

Deteriorating water quality in the Barataria Basin, at least partially correlated to wetlands loss and a commensurate reduction in the area's waste assimilation capacity, is a major problem affecting fish and wildlife in that portion of the study area. According to Bahr et al. (1983), factors that currently adversely affect water quality in the Barataria Basin are those generally related to urban development and associated urban pollution, altered land-use patterns, and hydrologic modifications (drainage, etc.) within the watershed. Two major human-related causes of water quality degradation include eutrophication and increased levels of toxic substances.

Essential Fish Habitat

Estuarine wetlands and associated intertidal and sub-tidal areas within the study area have been identified as Essential Fish Habitat (EFH) for post-larval, juvenile and sub-adult stages of brown

shrimp, white shrimp, red drum, and Gulf stone crab, as well as the adult stages of those species in near-shore and offshore waters. EFH has also been designated for various life stages of Spanish mackerel, bluefish, cobia, and mangrove snapper in the near-shore, marine-portion of the study area and in the lower portions of the estuary. EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, submerged aquatic vegetation, and estuarine water bottoms. Detailed information on federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the Gulf of Mexico Fishery Management Council. The generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act; P.L. 104-297).

In addition to being designated as EFH for various federally managed species, wetlands and water bottoms in the project area provide nursery and foraging habitats for a variety of economically important marine fishery species such as blue crab, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, and striped mullet. Some of these species serve as prey for other fish species managed under the Magnuson-Stevens Act by the Gulf of Mexico Fishery Management Council (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks). Wetlands in the project area also produce nutrients and detritus, important components of the aquatic food web, which contribute to the overall productivity of the Barataria Bay estuary.

Wildlife Resources

Mammals known to occur in the study-area bottomland hardwoods and marshes include white-tailed deer, mink, raccoon, swamp rabbit, nutria, river otter, and muskrat. Those habitats also support a variety of birds including herons, egrets, ibises, least bittern, rails, gallinules, olivaceous cormorant, anhinga, white pelicans, pied-billed grebe, black-necked stilt, sandpipers, gulls, and terns. Forested and scrub-shrub habitats within the study area also provide habitat for many resident passerine birds and essential resting areas for many migratory songbirds including warblers, orioles, thrushes, vireos, tanagers, grosbeaks, buntings, flycatchers, and cuckoos. Many of these and other passerine birds have undergone a decline in population primarily due to habitat loss.

Given the extent of development and drainage, waterfowl use within the hurricane protection system is likely minimal, except in the adjacent wetlands outside the levees. Swamps and fresh and intermediate marshes usually receive greater waterfowl utilization than brackish and saline marshes because they generally provide more waterfowl food. Migratory species expected to occur in the project area include gadwall, green-winged teal, blue-winged teal, fulvous whistling duck, northern shoveler, mallard, pintail, American widgeon, lesser scaup, ring-necked duck, redhead, and canvasback. Resident species expected to occur in that area include mottled duck and wood duck.

The study area also supports resident hawks and owls including the red-shouldered hawk, barn owl, common screech owl, great horned owl, and barred owl. The red-tailed hawk, marsh hawk, and American kestrel are seasonal residents which utilize habitats within the study area.

Amphibians such as the pig frog, bullfrog, leopard frog, cricket frog, and Gulf coast toad are expected to occur in the fresh and low salinity wetlands of the project area. Reptiles such as the American alligator, snapping turtle, soft-shell turtle, red-eared turtle, diamond-backed terrapin, speckled king snake, Gulf salt marsh snake, western cottonmouth, and various water snakes are also expected to occur in the project-area wetlands and waterbodies.

Endangered and Threatened Species

To aid the Corps in complying with their proactive consultation responsibilities under the Endangered Species Act (ESA), the Service provided a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District in an August 7, 2006, letter to the Corps regarding construction of and improvements to Federal and nonfederal hurricane/flood protection levees throughout southern Louisiana. The Service recommended that the Corps conduct ESA consultation as soon as project-specific plans were developed and impact locations were identified. In correspondence dated December 16, 2010, the Service provided our concurrence that there are no federally listed species located within the proposed project area. However, should plans be changed significantly, or if work is not implemented within 1 year following that coordination, we recommend that the Corps conduct annual re-initiation of ESA coordination with this office to ensure that the proposed project (or any future changes or modifications) would not adversely affect any federally listed threatened or endangered species or their habitat.

Migratory Birds

The Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.) and the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) offer additional protection to many bird species within the project area including colonial nesting birds and the bald eagle (*Haliaeetus leucocephalus*).

The project area is located where colonial nesting waterbirds may be present. LDWF currently maintains a database of these colonies locations. That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work sites for the presence of undocumented nesting colonies during the nesting season (e.g. February through September depending on the species). If colonies exist work should not be conducted within 1,000 feet of the colony during the nesting season.

The study-area forested wetlands provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Bald eagles generally nest in large trees located near coastlines, rivers, or lakes that support adequate food supplies. In the southeastern Parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Eagles may also nest in mature pine trees near large lakes in central and northern Louisiana. Major threats to

this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles defend "territories" that may be reoccupied annually. In addition to the active nest, a territory may include one or more alternate nests that are built and maintained by the eagles, but which are not used for nesting in a given year. Potential nest trees within a territory may, therefore, provide important alternative bald eagle nest sites. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods 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.

There are three known nest locations within 660 feet of Sections 1 and 2 of the NFL alignment. Although the bald eagle has been removed from the List of Endangered and Threatened Species, bald eagles and their nests continue to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) 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 BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. 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. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. Results of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. If after consulting those guidelines you need further assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, please contact this office.

Future Fish and Wildlife Resources

The combination of subsidence and sea level rise is called submergence or land sinking. As the land sinks the wetlands become inundated with higher water levels, stressing most non-fresh marsh plants, bottomland hardwood plants and even cypress-tupelo swamps leading to plant death and conversion to open water. Other major causes of wetland losses within the study area include altered hydrology, storms, saltwater intrusion (caused by marine processes invading fresher wetlands), shoreline erosion, herbivory, and development activities including the direct and indirect impacts of dredge and fill (Louisiana Coastal Wetlands Conservation and Restoration Task Force and the Wetlands Conservation and Restoration Authority 1998). The

continued conversion of wetlands and forested habitat to open water or developed land represent the most serious fish and wildlife-related problems in the study area. Those losses could be expected to cause significant declines in coastal fish and shellfish production and in the study area's carrying capacity for numerous migratory waterfowl, wading birds, other migratory birds, alligators, furbearers, and game mammals. Wetland losses will also reduce storm surge protection of developed lands, and will likely contribute to water quality degradation associated with excessive nutrient inputs.

ALTERNATIVES UNDER CONSIDERATION

The Corps is evaluating three construction alternatives:

Alternative 1 – No Action: This alternative would involve no construction and would have no impacts, but it does not meet the objective of the proposed action to reduce storm damage capability of the existing NFL system.

Alternative 2 – 50-year Level of Risk Reduction: This is the Corps' preferred alternative for which they have authorization to fund and construct. The authorized design elevation varies by reach as follows.

- Section 1 extends for 7 miles from Oakville to La Reussite. It would be upgraded to an elevation of 7.5 feet North American Vertical Datum of 1988 (NAVD) along the northern portion and 9.0 feet NAVD along the southern portion. The total area of impact including the existing levee footprint would be 133 acres.
- Section 2 extends for 11 miles from La Reussite to Myrtle Grove. It would be upgraded to an elevation of 9.0 feet NAVD along the northern portion (including levee reconstruction from ground level for 2 miles) and 11.5 feet NAVD along the southern portion. The total area of impact including the existing levee footprint would be 503 acres.
- The Corps has combined Sections 3 and 4 in their project analysis, and the total area of impact for both Sections 3 and 4 including the existing levee footprint would be 422 acres. Section 3 extends for 3 miles from Myrtle Grove to Citrus Lands; it would be upgraded to an elevation of 11.5 feet NAVD along the northern portion and 12.0 feet NAVD along the southern portion. Section 4 extends for 8 miles from Citrus Lands to Point Celeste; it would be upgraded to an elevation of 12.0 feet NAVD along the northern portion and 13.0 feet NAVD along the southern portion.
- Section 5 extends for 3 miles from Point Celeste to the NOV federal levee system near St. Jude. It would be upgraded to an elevation of 13.0 feet NAVD along the entire reach. The total area of impact including the existing levee footprint would be 115 acres.

Alternative 3 – Locally Preferred Plan (LPP): This is the local sponsor's preferred alternative for which they must fund any costs that exceed the Corps' authorized funding for the proposed project. This alternative is the same as Alternative 2 for Sections 3, 4, and 5, but differs in design elevations for Sections 1 and 2 as follows.

- Section 1 would be upgraded to an elevation of 10.5 feet NAVD along the northern portion and 12.5 feet NAVD for the southern portion. The total area of impact including the existing levee footprint would be 231 acres.

- Section 2 would be upgraded to an elevation of 9.0 feet NAVD along the northern portion and 11.5 feet NAVD for the southern portion. The total area of impact including the existing levee footprint would be 503 acres.

PROJECT IMPACTS

Proposed project impacts associated with the preferred alternative would result primarily from the expansion of existing levees, construction of 2 miles of new levee alignment, expansion of the levee right-of-way, and associated features (e.g., temporary workspaces, access roads). Although some of the construction will occur in cleared areas and on existing levees, project implementation will directly impact wet and non-wet bottomland hardwoods, cypress swamp, scrub-shrub, wetland pasture, and marsh habitats that provide a variable degree of low to high quality habitat value for diverse fish and wildlife resources (e.g., refugia, food resources, and nesting habitat) depending on the area of influence. Construction staging and processing areas would be sited essentially in cleared areas and on existing levees minimizing impacts to forested habitats.

Direct impacts to bottomland hardwood and swamp habitat were quantified by acreage and habitat quality (i.e., average annual habitat units or AAHUs) by Gulf South Research Corporation (GSRC) in coordination with the Service and NMFS. Those impacts are presented in Table 1. The Louisiana Department of Natural Resources (LDNR) Habitat Assessment Methodology (HAM) was used to quantify the impacts of proposed project features on non-wet and wet bottomland hardwood and swamp habitats. The habitat assessment models for bottomland hardwoods within the Louisiana coastal zone utilized in this evaluation were modified from those developed in the Service's Habitat Evaluation Procedures (HEP). For each habitat type, those models define an assemblage of variables considered important to the suitability of an area to support a diversity of fish and wildlife species.

GSRC used the Wetland Value Assessment (WVA) methodology to quantify impacts to fresh, intermediate, and brackish marsh habitats. No impacts to saline marsh would result from implementation of the proposed project; therefore, an impacts analysis for saline marsh was not necessary. The WVA is used to evaluate proposed projects under the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA), and is similar to the Service's HEP, in that habitat quality and quantity (acreage) are measured for baseline conditions and predicted for future without-project and future with-project conditions. As with HEP, the WVA provides a quantitative estimate of project-related impacts to fish and wildlife resources; however, the WVA is based on separate models for fresh-intermediate marsh, brackish marsh, and saline marsh. Further explanation of the assumptions affecting habitat suitability (i.e., quality) index (HSI) values for each target year for impacts to bottomland hardwood, swamp, and marsh habitats are available for review at the Service's Lafayette, Louisiana, Field Office.

The Corps' Habitat Evaluation System (HES) for open lands was used to quantify impacts to wetland pasture. The HES uses functional curves for determining a Habitat Quality Index (HQI) value for land use, diversity of land use, distance to cover, distance to wooded areas, frequency of flooding, tract size, and the perimeter development index. Those HQI values are then entered into a formula to estimate the AAHUs for wetland pasture.

Because scrub-shrub habitat can occur naturally in marsh areas or may be early successional bottomland hardwood forest, impacts to that habitat type were grouped according to nearby habitat characteristics and future predictions of habitat change within the area. In areas where scrub-shrub habitat was indicative of early successional forest habitat, impacts were grouped with the nearest bottomland hardwood forest type (i.e., wet or dry). In areas exhibiting subsidence and surrounded by marsh, impacts to scrub-shrub habitat were grouped with the nearest marsh type.

Table 1: Potential Estimated Impacts for the Preferred Alternative

HABITAT TYPES	LEVEE REACHES OF THE PREFERRED ALTERNATIVE									
	SECTION 1		SECTION 2		SECTIONS 3 AND 4		SECTION 5		TOTALS	
	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs	Acres	AAHUs
Swamp (PF02)[a]	24.87	-21.13	0	N/A[c]	0	N/A[c]	0	N/A[c]	24.87	-21.13
Seasonally Tidal BLH[b] (PFO1R)	14.61	-10.27	0.08	-0.06	13.39	-9.42	69.52	-48.90	97.6	-68.65
Altered BLH[b] (PFO1Ad)	8.99	-5.70	0	N/A[c]	36.56	-23.21	0.50	-0.32	46.05	-29.23
Wetland Pasture (PEM1CdR)	0	N/A[c]	73.56	-25.69	71.38	-24.93	0	N/A[c]	144.94	-50.62
Fresh/Intermediate Marsh (E2EM1P6)	10.36	-6.84	0	N/A[c]	0.05[d]	N/A[d]	0	N/A[c]	10.36[d]	-6.84[d]
Brackish Marsh (E2EM1P3)	0	N/A[c]	0	N/A[c]	10.84	-6.20	5.27	-2.72	16.16[d]	-8.92[d]

[a] (xxx) = National Wetlands Inventory (NWI) Classifications; [b] BLH = Bottomland Hardwoods; [c] N/A = Not Applicable;
[d] Because of the small acreage and its location, the assessment of intermediate marsh was combined with that of brackish marsh.

Direct impacts to 46.05 acres of hydrologically altered (i.e., non-wet) bottomland hardwood habitat would occur as a result of implementing the preferred alternative. Impacts would result from expansion of the existing levee and right-of-way and associated features. These impacts are primarily associated with large forested tracts which appear to be stressed as a result of hurricane and storm-induced damage.

Direct impacts to 97.6 acres of tidally-influenced bottomland hardwood habitat and 24.87 acres of swamp habitat would occur as a result of implementing the preferred alternative. Impacts would result from expansion of the existing levee and right-of-way and associated features. These impacts are primarily associated with large forested tracts on the flood-side of the existing levees. Project design goals intended to minimize direct impacts to forested wetlands by expanding the existing alignment to the protected side; however, increased post-Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement and increased impacts. Forested wetlands impacted by all sections of the preferred alignment provide a high degree of habitat value as well as storm buffering and water quality benefits.

Direct impacts to 10.36 acres of fresh marsh and 16.11 acres of brackish marsh would occur as a result of implementing the preferred alternative. The analysis for direct impacts to 0.05-acre of intermediate marsh was included with the brackish marsh analysis due its small size and location; that acreage is reflected in the AAHUs for brackish marsh. Impacts would result from expansion of the existing levee and right-of-way and associated features. These impacts are primarily associated with large areas of solid or broken marsh along the toe of the existing levee. Project design goals intended to minimize direct impacts to emergent wetlands by expanding the existing alignment to the protected side; however, increased post-Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement and increased impacts. Emergent wetlands impacted the preferred alignment provide a high degree of habitat value as well as storm buffering and water quality benefits.

Direct impacts to 144.94 acres of wetland pasture would occur as a result of implementing the proposed alternative. Impacts would result from expansion of the existing levee and right-of-way, construction of 2 miles of new levee, and associated features. These impacts are primarily associated with large tracts of wetland pasture which are located along the protected side of the existing levee in Section 2. Project design goals intended to minimize direct impacts to wetlands by remaining on the existing alignment with a slight shift to the protected side; however, increased post-Katrina design standards and the Corps' authorization limitations have resulted in an increased flood protection easement, a new alignment for 2 miles of levee in Section 2, and increased impacts.

FISH AND WILDLIFE CONSERVATION AND MITIGATION MEASURES

The President's Council on Environmental Quality (CEQ) defined the term "mitigation" in the NEPA regulations to include:

1. avoiding the impact altogether by not taking a certain action or parts of an action;
2. minimizing impacts by limiting the degree or magnitude of the action and its implementation;
3. rectifying the impact by repairing, rehabilitating, or restoring the affected environment;
4. reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and
5. compensating for the impact by replacing or providing substitute resources or environments.

The Service supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. Based on current and expected future without-project conditions, the planning goal of the Service is to develop a balanced project (i.e., one that is responsive to demonstrated hurricane protection needs while addressing the co-equal need for fish and wildlife resource conservation).

Direct and indirect impacts have been minimized by using the existing levee alignment and expanding to the protected side of the levee to the maximum extent practicable. However, the preferred alignment continues to impact wet and dry bottomland hardwoods, scrub-shrub habitat, fresh and brackish marsh, and wetland pasture. To further minimize impacts to those wetland

habitats the footprint could be reduced by implementing sheet-pile or cement floodwall into the design rather than increasing the earthen levee footprint. The Service recommends that these alternatives be evaluated further.

The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) identifies four resource categories that are used to ensure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value of forested and emergent wetlands and the relative scarcity of those habitat types, those wetlands are usually designated as Resource Category 2 habitats, the mitigation for which is no net less of in-kind habitat value. Remaining direct and indirect project impacts to forested wetlands should be mitigated via in-kind compensatory replacement of the habitat values lost. Degraded (i.e., non-wet) bottomland hardwood forest and any wet pastures that me be impacted, however, are placed in Resource Category 3 due to their reduced value to wildlife, fisheries, and lost/degraded wetland functions. Project impacts to wetlands will be minimized to some extent by hauling in material for the levee rather than using adjacent borrow. The mitigation goal for Resource Category 3 habitats is no net loss of habitat value.

Specific guidance and recommendations regarding mitigation planning can be found in Appendix A. The Service has also identified mitigation priority areas for the preferred alternative. Locations of those areas are provided in Appendix B. Selection of specific mitigation sites should be coordinated with the Service and other Federal and State natural resource agencies.

SERVICE POSITION AND RECOMMENDATIONS

Construction of the NFL hurricane protection system would result in direct impacts to -29.23 AAHUs of hydrologically altered bottomland hardwood forest, -68.65 AAHUs of tidally influenced bottomland hardwood forest, -21.13 AAHUs of swamp, -6.84 AAHUs of fresh marsh, -8.92 AAHUs of brackish marsh (includes adjacent intermediate marsh), and -50.62 AAHUs of wetland pasture. The Service does not object to providing improved hurricane protection to 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 levee designs) and position flood protection features so that destruction of forested and emergent wetlands and non-wet bottomland hardwoods are avoided or minimized.

2. The Corps shall fully compensate for any unavoidable losses to wet and non-wet 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 enclosed in Appendix A.

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

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

5. Avoid adverse impacts to bald eagle nesting locations and wading bird colonies through careful design of project features and timing of construction. A qualified biologist should inspect the proposed work site for the presence of undocumented wading bird nesting colonies and bald eagle nests during the nesting seasons (i.e., February 16 through October 31 for wading bird colonies, and October through mid-May for bald eagles).

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 non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid affecting them during the breeding season.

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 on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary and those results should be forwarded to this office.

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

9. Acquisition, habitat development, maintenance and management of mitigation lands should be allocated as first-cost expenses of the project, and the local project-sponsor should be responsible for operational costs. If the local project-sponsor is unable to fulfill the financial mitigation requirements for operation, then the Corps should provide the necessary funding to ensure mitigation obligations are met on behalf of the public interest.

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 the Service 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.

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.

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

13. A report documenting the status of mitigation implementation and maintenance should be prepared by the managing agency and provided to the Corps, the Service, NMFS, the Environmental Protection Agency, the Louisiana Department of Natural Resources, and LDWF. That report should also describe future management activities and identify any proposed changes to the existing management plan.

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APPENDIX A
MITIGATION GUIDANCE AND RECOMMENDATIONS

On April 10, 2008, the U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) issued regulations governing compensatory mitigation for activities authorized by Department of the Army permits (Federal Register, Vol. 73, No. 70). According to the Federal Register, those regulations establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects. The following summary outline generally describes the process of developing a mitigation plan as outlined in those regulations (see the Federal Register for a detailed description of each step).

1. Objectives: a description of the resource type(s) and amount(s) that would be provided as mitigation, the method of compensation, and the manner in which the resource functions of the compensatory mitigation project would address the needs of the geographic area of interest.
2. Site Selection: a description of the factors considered during the site selection process.
3. Site Protection Instrument: a description of the legal arrangements and instrument that would be used to ensure long-term protection of the compensatory mitigation project site.
4. Baseline Information: a description of the ecological characteristics of the proposed compensatory mitigation project site.
5. Determination of Credits: a description of the number of credits to be provided, including a rationale for that determination.
6. Mitigation Work Plan: detailed written specifications and work descriptions for the compensatory mitigation project.
7. Maintenance Plan: a description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.
8. Performance Standards: ecologically based standards that will be used to determine whether the compensatory mitigation project is achieving its objective.
9. Monitoring Requirements: a description of parameters to be monitored in order to determine if the mitigation project is on track for achieving its performance standards and if adaptive management is needed.
10. Long-term Management Plan: a description of the manner in which the compensatory mitigation project will be managed after the performance standards have been achieved to ensure the long-term sustainability of the resource.
11. Adaptive Management Plan: a management strategy to address unforeseen changes in site conditions or other mitigation project components.
12. Financial Assurances: a description of the financial assurances that would be provided and how they are sufficient to ensure a high level of confidence that the mitigation project will be successfully completed in accordance with its performance standards.

Accordingly, the U.S. Fish and Wildlife Service (Service) provides the following assumptions for each habitat type that would be impacted by the proposed New Orleans to Venice, Louisiana, Hurricane Protection Project (NOV) – Incorporation of Nonfederal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana (NFL), as guidance and recommendations for concurrent development of mitigation for impacts resulting from implementation of that project.

The goal of the mitigation plan is to provide for equal replacement of the habitat units lost due to re-construction of the hurricane/flood protection projects. The equal replacement compensation goal specifies that the gain of one habitat unit can be used to offset the loss of one habitat unit. Achieving this goal would re-establish, maintain, and protect bottomland hardwood habitats (wet and non-wet), swamp, marsh, and wetland pasture as species diverse, sustainable habitats by restoring/maintaining unique functions, values, and services. The objectives of the mitigation measures for bottomland hardwood forest and swamp would be to establish and maintain a high diversity of native mast- and fruit-producing trees and shrubs, maximize herbaceous and shrub-layer canopy cover while maintaining a semi-mature to mature bottomland hardwood timber stand.

Mitigation development would always include activities not necessarily to produce habitat value but also to protect the mitigation lands and to provide features necessary for adequate management. Such activities would include but are not limited to controlling access, defining boundaries, protection of surface rights, and stewardship. Access to the mitigation site should be restricted to ensure that the development of the mitigation site is successful. In order to post the property and control access, surveying and establishing property boundaries would be required. This information would be used for the location and posting of perimeter boundary signs. Fencing along with gates could be utilized to control access. Stewardship would include surveillance to protect the area from vandalism and other disturbances by maintaining a regularly-seen physical presence by staff in the area. All of the above tasks are considered to be a single mitigation increment. The above measures (fence/signage repair and replacement and stewardship) would also be included as operational and maintenance measures over the project life.

I. PROPOSED STANDARDIZED ASSUMPTIONS FOR BOTTOMLAND HARDWOOD FOREST

The following represents the basic assumptions utilized in doing a bottomland hardwood Wetland Value Assessment (WVA, also referred to as Habitat Assessment Methodology [HAM]) for two different mitigation scenarios. Those scenarios include what is currently referred to as enhancement and restoration. Enhancement does not fit the terminology of enhancement under the Fish and Wildlife Coordination Act and/or Water Resources Development Act, but it is used to distinguish between the two scenarios. Each scenario is explained in the paragraphs following the paragraph on general mitigation needs common to both scenarios.

General

All habitat scenarios would emphasize tree species diversity by restoring or increasing native species within the over-story and mid-story to increase habitat values. The wildlife habitat value of these areas would be substantially improved by removing and controlling exotic species, primarily Chinese tallow-tree and possibly other noxious species, i.e., black willow, box elder, if needed, and planting native bottomland hardwood trees (e.g., Nuttal, overcup, and water oaks, sycamore, American elm, green ash, bitter pecan, red maple, persimmon, tupelo, and bald cypress) and some shrubs (e.g., mayhaw, hawthorn and buttonbush) that are suited to the soils and hydrology of the site.

In areas that could become dominated by Chinese tallow-trees, seedling planting densities would be approximately 9- by 9-foot spacing for 538 trees per acre, while shrubs would be planted on a 20- by 20-foot spacing (109 per acre) to quickly establish a canopy and minimize competition. Predation guards would be utilized as necessary to protect the seedlings from herbivory. Replanting of seedlings would be conducted to achieve short-term, interim and long-term success criteria as defined in Section I.B of this Appendix. Natural recruitment of native tree species would be included in determining the percent survival rate. Re-application of herbicide to control Chinese tallow-trees in all areas during the initial 10-year period would also be necessary to ensure success of the mitigation-related management measures.

To achieve bottomland hardwood restoration a mixture of both hard mast and soft mast species will be planted. The hardmast species will constitute between 60 and 70 percent of the stand and can consist of: bitter pecan (*Carya lecontei*), water hickory (***Carya aquatica***), willow oak (*Quercus phellos*), water oak (*Quercus nigra*), live oak (***Quercus virginiana***), overcup oak (*Quercus lyrata*) and Nuttall oak (*Quercus nuttalli*). The softmast species (30–40 percent of the stand) can consist of: Drummond red maple (*Acer rubrum* var. *drummondii*), green ash (***Fraxinus pennsylvanica***), bald cypress *(Taxodium distichum)*, American elm (***Ulmus americana***), sweetgum (*Liquidambar styraciflua*), sugarberry (***Celtis laevigata***), common persimmon (*Diospyros virginiana*) and sycamore *(Platanus occidentalis)*. Other native species suited to the site and local conditions may also be planted.

Monitoring

As a part of the development activities, Monitoring Plots (MP) will be established. Plots will be established systematically over the mitigation area (1 per ten acres). Following the initial MP establishment, the HAM evaluation parameters will be measured and recorded for each MP at

minimum during years 1, 2, 5, 7, 10 during the development period in order to monitor the success of the mitigation implementation plan.

Surveys of the MPs established in the development period will be continued over the project life. A monitoring plot report will be prepared to establish a record of the plot measurements and management recommendations for the first 10 years. During this period, copies of the resulting report from the MP surveys will be provided to the resource agencies (Service, Corps, EPA, National Marine Fisheries Service [NMFS], and Louisiana Department of Wildlife and Fisheries [LDWF]). Survey records should be used to document mitigation effectiveness or to document the need for change in the habitat development program early in the mitigation process. Prior to measurement of plots, an invitation to participate in the measurements will be provided to those agencies.

For MP activities after target year (TY) 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated. In addition, following the first 10-year period, monitoring should be continued on a 5-year basis as described previously. Details of the monitoring program, success criteria, and reporting requirements are outlined below.

A. Habitat Assumptions for Bottomland Hardwood Mitigation

Enhancement

In areas dominated by Chinese tallow-trees, seedling planting densities would be approximately 9- by 9-foot spacing for 538 trees per acre, while shrubs would be planted on a minimum spacing of 20- by 20-foot (109 per acre) to quickly establish a canopy and minimize competition. Predation guards would be utilized as necessary to protect the seedlings from herbivory. Replanting of seedlings would be conducted to achieve short-term, interim and long-term success criteria as defined in Section I.B. of this Appendix. Natural recruitment of native tree species would be included in determining the percent survival rate. Re-application of herbicide to control Chinese tallow-trees in all areas during the initial 10-year period would also be necessary to ensure success of the mitigation-related management measures.

To achieve bottomland hardwood restoration a mixture of both hard mast and soft mast species will be planted that are suited to the site and local conditions. The hard-mast species will constitute between 60 and 70 percent of the stand and will consist of a combination of as diverse hard-mast species as possible. The soft-mast species (30 – 40 percent of the stand) will also consist of a diverse assemblage. Consideration will be given to reducing the planting of soft-mast species along the edge of the mitigation site when light seeded species are in adjacent forested habitats.

Control of Chinese tallow-tree would be accomplished by application of herbicide on localized concentrations of exotic or noxious trees or individual trees. Under-planting with mast-bearing seedlings (e.g., elm, oaks and sugarberry) would be done in those areas where needed as determined by vegetation surveys. Subsequent seedling survival checks would be carried out the year after planting and re-plantings would be done as necessary. Management activities would include replanting of seedlings which is anticipated to occur in TY 2, 5, 7, and 10 and extensive herbicide application for Chinese tallow-tree in TY 0, 1, 2, 3, 5, 7 and 10. It is assumed that

approximately 25 percent of the seedlings would need to be replanted after one year. Planting of mid-story and shrub species (i.e., hawthorn, mayhaw, and persimmon) should be planned but a less dense spacing may be used based on mid-story species found on that site.

Implementation of the proposed management plan is predicted to improve and maintain the habitat value of the bottomland hardwood ridges for wildlife. Mitigation-area habitat values would increase due to the increased quantity and quality of mast-producing trees, and moderate increases in shrub and herbaceous cover after planting. Changes by target year in the Habitat Suitability Index (HSI) values (Table 1) reflect predicted habitat conditions under future-with and without-management scenarios. HSI values for HAM under future with-management conditions for sites still dominated by hurricane-damaged native tree species were projected based on the following assumptions:

Year 0 – Existing conditions: The mitigation site consists of a hurricane-damaged stand of mixed bottomland hardwood tree species (e.g., live oak, sugarberry) with a relatively low stocking rate and relatively open canopy. Portions of the area have varying densities of Chinese tallow-tree in both the mid- and understory; mast trees are moderately abundant.

Year 0 through 1 – Property has been surveyed and posted and vehicle access features for management are being constructed. Monitoring plots are established in this area. Remaining Chinese tallow-trees or new sprouts in the under- and midstory area have been reduced through herbicide application. Selected areas have been under-planted with hardmast seedlings, and other bottomland hardwood species suited to the site. Some shrub/scrub species (e.g., mayhaw, hawthorn, and persimmon) have also been planted to ensure diversity within the forest and provide mid-story cover.

Years 2 through 3 – Snags have been created from herbicide application conducted on Chinese tallow-trees in TY1. Herbaceous vegetation has increased in those areas subjected to herbicide application and planting in TY1. Seedling survival rates have been determined and replanting has been accomplished, as necessary. Monitoring plots have been re-surveyed, and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

Years 4 through 10 – Habitat development practices continue at a level necessary to achieve an overall canopy closure between 40 and 80 percent. The average diameter of the stand is reduced where under-planting and natural regeneration are being promoted. Under-planting continues where necessary to increase the future density of native vegetation and achieve required seedling survival rate. Herbaceous and shrub cover increases slightly but begins to decline toward the end of this time period in response to canopy development. Seedling survival rates are determined and replanting is accomplished, as necessary. Control of Chinese tallow-trees and noxious species continues throughout the area, but the presence of those species has been significantly reduced (i.e., less than 5% on an acre-by-acre basis). Monitoring plots are re-surveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation summary reports.

Years 11 through 25 – Habitat development practices continue. Some native saplings and young trees begin to grow into the mid- and over-story in areas previously planted. Mast-producing tree species become increasingly dominant in the over-story canopy with mast production increasing at the end of this time period. Control of exotic and noxious species continues throughout the area. Plots are monitored and reports documenting mitigation implemented and necessary modifications are produced. If mitigation effectiveness is proceeding as anticipated, then the number of monitoring plots will be reduced by 50 percent after TY 20.

Years 26 through 50 – Bottomland hardwood management practices continue. Oak seedlings planted during earlier years begin producing mast. The percentage of mast (hard and soft) species in the canopy reaches optimum levels. The number of native species has significantly increased with exotic and noxious species still occurring on only 5% of the area on an acre-by-acre basis. Monitoring continues, and the mitigation plan is adaptively modified as necessary to achieve and maintain mitigation. Control of exotic and noxious species continues throughout the area. Mitigation reports that summarize mitigation implemented, results of monitoring plots, and proposed and implemented adaptive mitigation changes are produced.

Table 1. Habitat Suitability Index Values for the Enhanced Site

	Habitat Suitability Index Values	
(HAM Bottomland Hardwoods)	Target Year	Future-with-management
	0	0.72
	1	0.73
	20	0.80
	50	0.80

Habitat Assessment Methodology: Analysis of Compensation Needs

The difference between future with-management and future without-management average annual habitat unit (AAHU) values expected to result from the above-described mitigation scenario (Table 3) reflect the expected net benefit of the management actions.

The intensive habitat development activities described previously for this area were input into the habitat model to calculate the AAHU value of the area over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.19).

Reforestation

Site Development

This area is dominated by Chinese tallow-tree. In the summer of TY 0 the entire site would be treated with herbicide by aerial or ground spraying. In the following year (TY 1) the entire site would again treated with herbicide but using ground equipment. In the fall/winter of TY 1, tree seedlings and mid-story shrub/scrub (hawthorn, mayhaw, persimmon, etc.) species would be

planted and MPs established. Management activities would include replanting of seedlings which is anticipated to occur in TY 2, 3, 5, 7, and 10 and extensive herbicide application for Chinese tallow-tree in TY 2, 3, 5, 7 and 10. Replanting and herbicide application is estimated at 80 percent of the site after the initial planting and at 10 percent of the site in the subsequent TYs.

The entire acreage would be planted with mast-producing species suited to the soil(s) and site conditions. Mid-story species (i.e., shrub species) could include mayhaw, hawthorn, and persimmon. Planting of mast-producing species would be on by 9-foot x 9-foot centers (538/acre) and mid-story species on 20-foot x 20-foot centers (109/acre) in order to quickly establish a dense canopy and to minimize the re-establishment and growth of Chinese tallow-trees. Hard to soft mast tree species ratio should range between 60 and 70 hard-mast species to 30-40 soft-mast species.

Implementation of the proposed management plan would restore native bottomland hardwood species and shrub/scrub species and improve the habitat value of this area. Habitat values would increase due to the increased quantity and quality of native bottomland hardwood species, especially mast-producing trees and mid-story species. Changes by target year in the HSI values (Table 2) reflect predicted habitat conditions under future-with- management scenarios.

HSI values for HAM under future-with-management conditions for Chinese tallow-tree dominated areas were projected based on the following assumptions:

Year 0 – Existing conditions: Vegetation in the mitigation area consists primarily of Chinese tallow-tree and very few native bottomland hardwood species. Mast trees are almost nonexistent and very little mid-story exists. Initial herbicide application is conducted during the summer.

Year 0 through 1 – Property has been surveyed and posted. Monitoring plots are established. Over-story and mid-story cover has been significantly reduced by summer time herbicide application in TY 0 and 1. Areas have been planted in the fall/winter with hard mast and bottomland hardwood species (e.g., American elm, green ash, and sugarberry) native to the area and suited to the site. Some shrub/scrub species (e.g., mayhaw, hawthorn, and persimmon) have also been planted to ensure diversity within the forest.

Years 2 through 3 – Herbaceous vegetation has increased in those areas subjected to herbicide application and seedling planting in TY1. Portions of the area may undergo selective herbicide application where needed to maintain control Chinese tallow-tree and other species that threaten survival of planted seedlings. Seedling survival rates are determined and replanting is conducted, as necessary. Monitoring plots are re-surveyed and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

Years 4 through 10 – Seedling survival rates are determined and replanting continues where necessary to increase the future density of hard-mast producers and other bottomland hardwood vegetation. A limited amount of the area may undergo selective herbicide

application where needed to maintain control of Chinese tallow-tree and other exotic and/or noxious species. Herbaceous and shrub cover has increased due to previous herbicide applications to Chinese tallow-tree over-story and planting of shrub/scrub mid-story species. Monitoring plots are re-surveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation monitoring reports.

Years 11 through 25 – Habitat development practices, e.g., control of Chinese tallow-tree, continue as necessary. Some saplings and young trees begin to die in areas maintained with a dense canopy closure (i.e., high basal area) creating snags. Mast-producing tree species become increasingly dominant as the over-story canopy develops and some mast is produced at the end of this time period. Mid- and under-story vegetation begins to decrease in response to canopy development. Plots are monitored, and reports documenting mitigation implemented and necessary modifications are produced. If mitigation effectiveness is proceeding as anticipated, the number of monitoring plots can be reduced by 50 percent after TY 20.

Years 26 through 50 – Bottomland hardwood management practices continue, as necessary. Most oak and other hard-mast seedlings planted during earlier years begin producing mast. The number of mast-producing species has increased and is reaching optimum levels. Monitoring continues and the plan is adaptively modified as necessary to achieve projected mitigation benefits. Reports summarizing mitigation implemented, results of monitoring, and proposed and implemented mitigation changes are produced.

Table 2. Habitat Suitability Index Values for Chinese tallow-tree dominated areas.

Habitat Suitability Index Values *(HAM Bottomland Hardwoods)*	
Target Year	Future-with-management
0	0.10
1	0.04
20	0.58
50	0.80

The intensive habitat development activities described previously for this area were input into the habitat model to calculate the AAHU value of the site over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.13).

B. Mitigation Success Criteria, Monitoring Program, and Reporting Requirements

1. SUCCESS CRITERIA

a. Initial Success Criteria

i. **Hydrology:** Site specific language will be needed.

ii. **Vegetation:** For the bottomland hardwood areas, a minimum of 50 percent or 266 planted seedlings per acre, consistent with the planted ratio of hard mast to soft mast-

producing species, must survive through the end of the first growing season following the planting (i.e., Year 1). This criterion will apply to initial plantings as well as any subsequent replanting that may be needed.

b. Interim Success Criteria

i. **Hydrology**: Site specific language will be needed.

ii. **Vegetation and Vegetative Plantings**:

- For a given planting, a minimum of 300 seedlings per acre for bottomland hardwood must survive through the end of the fourth year (i.e., Year 5) following successful attainment of the one-year survivorship criteria. Trees established through natural recruitment may be included in this tally; however, a range of 120 to 140 hard mast-producing seedlings per acre must be present within the bottomland hardwood areas. Noxious/exotic species (i.e., Chinese tallow-tree, China berry, black willow, and box elder) may not be included in this tally.
- By Year 5 following successful attainment of the one-year survivorship criteria, the acreage and the perimeter of that acreage shall be, within all reasonable efforts, virtually free of exotic vegetation and have a minimal presence of noxious species (i.e., less than 5% on an acre-by-acre basis).
- Planted tracts must exhibit characteristics and diversity indicative of a viable native forested community commensurate with stand age and site conditions by Year 5.

c. Long-term Success Criteria (Year 15):

i. By year 15, 10 years following successful attainment of the 5-year survivorship criteria, a healthy component of mid-story species shall be established. Typically, 75 mid-story plants per acre will be sufficient and will comprise those species initially planted and those species present via natural recruitment. If the site is deficient in mid-story abundance and diversity, additional planting to achieve the 75 mid-story plants per acre requirement will be required.

ii. At the time of tree-canopy closure (i.e., 15 years) the site shall be, within all reasonable efforts, essentially void of noxious/exotic vegetation (approximately 5% or less of the over-story vegetation on an acre-by-acre basis). An active treatment program shall continue as part of the long-term maintenance program.

iii. If determined necessary, timber thinning shall be performed subject to approval by the Corps, the Service, EPA, and LDWF of a timber management plan. Measures to control the encroachment of noxious/exotic vegetation after the thinning operation shall be included in the timber management plan and implemented.

2. REPORTING PROTOCOLS AND MONITORING PLAN

a. Monitoring and Reporting Provisions

Plots shall be established to monitor the mitigation and demonstrate compliance with the success criteria established above and achievement of WVA benefits. Monitoring reports will be submitted by December 31 of each monitoring year. The monitoring program shall follow the guidelines established below:

i. **Visual Description**: Visual descriptions shall be provided with each monitoring report. Digital images recorded on compact disc shall be submitted from each survey plot at each monitoring period.

ii. **Initial and Interim Success Criteria:**

- One plot per 10 acres shall be established. Plots are 1/50-acre plots (0.2 acre) and should be established prior to or immediately following the initial planting. Plots should be identified with a permanent marker (e.g., 8-foot PVC pipe anchored with a metal T-post) and GPS coordinates shall be recorded. A map depicting the location of the survey plots and a listing of the geographic coordinates shall be provided. The survey plots should be representative of the plantings. The species (including the number of individuals), height (until long-term success criteria is met i.e., year 15 criteria), and diameters of each tree should be recorded.
- A survey of living and dead seedlings near the end of the planting season when new growth can be identified shall be undertaken. In addition, a visual examination of the entire planted acreage to determine if the survey results are indicative of overall survival rates shall be undertaken. A written report indicating the number and species of surviving seedlings in each survey plot should be produced.
- The report also shall describe the condition of applicable hydrology altering features (culverts), the general condition of the seedlings, and discuss likely causes for observed mortality (e.g., herbivory, drought, etc.) within those plots that did not exhibit a seedling survival rate as indicated by the success criteria.
- The report shall identify the generalized degree and location of exotic/noxious species colonization and identify measures that will be implemented to eradicate them.

iii. **Continuous Monitoring Reports:**

- The plots established in paragraph 2a above will be utilized for continuous monitoring. All trees falling within the plot should be permanently tagged and numbered and the number, species and diameters of trees within each plot shall be recorded.
- The report shall identify seedling survivorship and colonization by volunteer mid-story and over-story species. Also included in the report would be the results of the vegetation survey including visual estimates of percentage (%) of canopy, mid story and over story closure, % of canopy cover comprised of soft mast and hard mast species (differentiated), % canopy cover comprised by bald cypress, % exotic vegetation in each vegetation layer, survival rate of planted vegetation, and an estimate of natural regeneration in mid- and understory by species shall be included in the report.
- The report must include a discussion of the general health or vigor of the planted trees.
- The report must include a description of the overall condition of the entire mitigation area.
- The report must include a description of observed wildlife usage.
- The report must summarize the overall condition of the mitigation relative to the goals and success criteria.

- The report must identify maintenance activities performed on mitigation lands.
- The report must include a discussion of the measures used to control noxious/exotic species colonization/establishment.

iv. **Schedule:**

- Vegetative monitoring and reports shall be completed in the spring (when new growth makes identification practicable) of years 1, 2, 5, 7, 10, 15, and prior to and following the any thinning operation. Following the more intensive surveying of the first 10-year period, monitoring should be continued on a 5-year basis as previously described. For monitoring activities after year 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated.
- If the year 1 vegetative success criterion is obtained, but all performance standards have not been met in the 3rd and 5th year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).
- Reports discussing measure to control exotic/noxious species shall be provided annually until such time as all initial success criteria and interim success criteria identified in the above sections have been met and documented in reports, and thereafter according to the schedule identified in 4(a) above. The annual reports should document items such as noxious/exotic species, method of treatment/control, machinery and/or chemical treatments utilized, timing of treatments/work, effectiveness of previous treatments/work, etc.
- Monitoring reports will be submitted by December 31 of each monitoring year. Monitoring reports shall be provided to the Corps, the Service, EPA, and LDWF.

C. Contingency and Remedial Actions and Responsibilities

In the event monitoring reveals that initial success criteria have not been met, measures shall be taken to achieve those criteria in accordance with the following plan:

1. If survival is less than 50 percent per acre as determined by sampling or by observing high mortality at any location within the planted areas, or target species ratios are not met, replanting, monitoring and reporting, as previously described, shall occur as needed to achieve and document the required one-year survival rate.
2. If the survival criterion is not met after three unsuccessful attempts, the Corps, the Service, EPA, and LDWF will reassess the mitigation to determine whether the use of the mitigation area should be discontinued or if a new management potential should be calculated incorporating the new conditions.
3. Year 5 monitoring shall verify seedling composition and survivorship goals established in the above section. Remedial action, as deemed necessary to ensure attainment of year 5 survivorship and composition criteria shall be implemented.

II. PROPOSED STANDARDIZED ASSUMPTIONS FOR SWAMP

The following represents the basic assumptions utilized in doing a WVA for Swamp. All habitat scenarios would emphasize tree species diversity by restoring or increasing native species within the over-story and mid-story to increase habitat values. Trees to be planed will be a mixture of bald cypress and tupelo gum (*Nyssa aquatica*) as well as other species suited to the site and local conditions. Planting rates will consist of approximately 70-75 percent bald cypress, 15-20 percent tupelo, 10 percent Drummond red maple, 10 percent green ash, and 5 percent buttonbush (*Cephalanthus occidentalis*.).

Monitoring

As a part of the development activities, Monitoring Plots (MP) will be established. Plots will be established systematically over the mitigation area (1 per ten acres). Following the initial MP establishment, the HAM evaluation parameters will be measured and recorded for each MP at minimum during years 1, 2, 5, 7, 10 during the development period in order to monitor the success of the mitigation implementation plan.

Surveys of the MPs established in the development period will be continued over the project life. A monitoring plot report will be prepared to establish a record of the plot measurements and management recommendations for the first 10 years. During this period, copies of the resulting report from the MP surveys will be provided to the other resource agencies (Corps, EPA, NMFS, and LDWF). Survey records should be used to document mitigation effectiveness or to document the need for change in the habitat development program early in the mitigation process. Prior to measurement of plots, an invitation to participate in the measurements will be provided to those agencies.

For MP activities after TY 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated. In addition, following the first 10-year period, monitoring should be continued on a 5-year basis as described previously. Details of the monitoring program, success criteria, and reporting requirements are presented in Section II.A of this Appendix.

Site Development

In the fall/winter of TY 1, bald cypress seedlings (and other flood tolerant species) and buttonbush would be planted and monitoring plots established. Management activities would include replanting of seedlings in TY 2, 3, 5, 7 and 10 and herbicide application for Chinese tallow-tree and other noxious species during each of the first 10 years. Replanting and herbicide application is estimated at 25 percent of the site after the initial planting and at 10 percent of the site in the subsequent TYs.

The entire area would be planted with water tolerant species such as green ash, tupelo, and bald cypress. Planting of trees would be on by 9-foot x 9-foot centers (538/acre) and mid-story species on 15-foot x 15-foot centers (194/acre) in order to quickly establish a dense canopy and to minimize the establishment and growth of new Chinese tallow-trees. Replanting and herbicide application rates noted earlier are based on the need to maintain a 75 percent survival rate of planted seedlings by TY

10. In areas where Chinese tallow is not prevalent, or because of local conditions it may not colonize, the planting density can be on 10-foot x 10-foot centers (436/acre).

Implementation of the proposed management plan would restore swamp species and improve the habitat value of this area. Habitat values would increase due to the increased quantity and quality of native species. Changes by target year in the HSI values (Table 3) reflect predicted habitat conditions under future-with- management scenarios.

HSI values for HAM under future-with-management conditions were projected based on the following assumptions:

Year 0 – Existing conditions. Vegetation in the mitigation area consists primarily of shrub/scrub and regenerating black willow and species diversity is limited. Herbicide application is conducted.

Year 0 through 1 – Property has been surveyed and posted, and vehicle access features for management are being constructed. Water control structure is constructed and operated to reduce water elevations to aid in planting efforts and survival. Re-application of herbicide is undertaken. A minimum of 6 monitoring plots are established throughout the mitigation area. Midstory cover has been reduced by herbicide application during both years. Areas have been planted with bald cypress, tupelo, green ash, and other native trees suited to the site. Shrub/scrub species (e.g., buttonbush) has also been planted to ensure diversity within the forest.

Years 2 through 3 – Herbaceous vegetation has increased in those areas where seedlings have been planted in TY1. Large portions of the area may undergo selective herbicide application where needed to control Chinese tallow-tree and other noxious species (e.g., black willow) that threaten survival of planted seedlings. Seedling survival rates are determined and replanting is conducted, as necessary. Monitoring plots are re-surveyed and necessary alterations to the mitigation plan are proposed and reported in the mitigation monitoring report.

Years 4 through 10 – Seedling survival rates are determined and replanting continues where necessary to increase the future density of mast producers and other bottomland hardwood vegetation. A limited amount of the area may undergo selective herbicide application where needed to maintain control of exotic and noxious species. Herbaceous and shrub cover has increased; however, a canopy begins to develop at the end of this period. Monitoring plots are re-surveyed and necessary modifications to achieve the mitigation goals are proposed and reported in the mitigation monitoring reports.

Years 11 through 25 – Habitat development practices, e.g., control of Chinese tallow-tree, continue as necessary. Some saplings and young trees begin to die in areas with a dense canopy closure (i.e., high basal area) creating snags. Tree species become increasingly dominant in the overstory canopy. Mid and understory vegetation are reduced in response to canopy development. Plots are monitored, and reports documenting mitigation implemented and necessary modifications are produced as needed. If mitigation

effectiveness is proceeding as anticipated, the number of monitoring plots can be reduced by 50 percent after TY 20.

Years 26 through 50 – Bottomland hardwood management practices continue, as necessary. Bald cypress seedlings planted during earlier years begin producing mast. The number of tree species has increased. Monitoring continues and the plan is adaptively modified as necessary to achieve projected mitigation benefits. Reports summarizing mitigation implemented, results of monitoring, and proposed and implemented mitigation changes are produced.

Table 3. Habitat Suitability Index Values for Swamp Sites.

Habitat Suitability Index Values *(HAM Bottomland Hardwoods)*	
Target Year	Future-with-management
0	0.06
1	0.09
20	0.46
50	0.75

The intensive habitat development activities described previously for this sub-area were input into the habitat model to calculate the AAHU value of the site over the life of the project. This AAHU value was then used to determine the per acre AAHU value (0.17).

A. Mitigation Success Criteria, Monitoring Program, and Reporting Requirements

1. SUCCESS CRITERIA

a. Initial Success Criteria:

i. **Hydrology:** Site specific language will be needed.

ii. **Vegetation:** For the bottomland hardwood areas, a minimum of 50 percent or 266 planted seedlings per acre, consistent with the planted ratio of hard mast to soft mast-producing species, must survive through the end of the first growing season following the planting (i.e., Year 1). For the swamp areas, 97 bald cypress/tupelo seedlings, consistent with the planted ratio, must survive to the end of the first growing season. This criterion will apply to initial plantings as well as any subsequent replanting that may be needed.

b. Interim Success Criteria:

i. **Hydrology:** Site specific language will be needed.

ii. **Vegetation and Vegetative Plantings:**

- For a given planting, a minimum of 97 seedlings per acre for bald cypress must survive through the end of the fourth year (i.e., Year 5) following successful attainment of the one-year survivorship criteria. Trees established through natural recruitment may be included in this tally. Noxious/exotic species (i.e.,

Chinese tallow-tree, China berry, black willow, and box elder) may not be included in this tally.

- By Year 5 following successful attainment of the one-year survivorship criteria, the acreage and the perimeter of that acreage shall be, within all reasonable efforts, virtually free of exotic vegetation and have a minimal presence of noxious species (i.e., less than 5% on an acre-by-acre basis).
- Planted tracts must exhibit characteristics and diversity indicative of a viable native forested community commensurate with stand age and site conditions by Year 5.

c. **Long-term Success Criteria (Year 15):**

i. By year 15, 10 years following successful attainment of the 5-year survivorship criteria, a healthy component of midstory species shall be established. Typically, 75 midstory plants per acre will be sufficient and will comprise those species initially planted and those species present via natural recruitment. If the site is deficient in midstory abundance and diversity, additional planting to achieve the 75 midstory plants per acre requirement will be required.

ii. At the time of tree-canopy closure (i.e., 15 years) the site shall be, within all reasonable efforts, essentially void of noxious/exotic vegetation (approximately 5% or less of the overstory vegetation on an acre-by-acre basis). An active treatment program shall continue as part of the long-term maintenance program.

iii. If determined necessary, timber thinning shall be performed subject to approval by the Corps, the Service, EPA, and LDWF of a timber management plan. Measures to control the encroachment of noxious/exotic vegetation after the thinning operation shall be included in the timber management plan and implemented.

B. Reporting Protocols and Monitoring Plan

1. MONITORING AND REPORTING PROVISIONS

Plots shall be established to monitor the mitigation and demonstrate compliance with the success criteria established above and achievement of WVA benefits. Monitoring reports will be submitted by December 31 of each monitoring year. The monitoring program shall follow the guidelines established below:

a. **Visual Description:** Visual descriptions shall be provided with each monitoring report. Digital images recorded on compact disc shall be submitted from each survey plot at each monitoring period.

b. **Initial and Interim Success Criteria:**

i. One plot per 10 acres in each sub-area shall be established. Plots are 1/50-acre plots (0.2 acre) and should be established prior to or immediately following the initial planting. Plots should be identified with a permanent marker (e.g., 8-foot PVC pipe anchored with a metal T-post) and GPS coordinates shall be recorded. A map depicting the location of the survey plots and a listing of the geographic coordinates shall be provided. The survey plots should be representative of the plantings. The species (including the number of individuals), height (until long-

term success criteria is met i.e., year 15 criteria), and diameters of each tree should be recorded.

ii. A survey of living and dead seedlings near the end of the planting season when new growth can be identified shall be undertaken. In addition, a visual examination of the entire planted acreage to determine if the survey results are indicative of overall survival rates shall be undertaken. A written report indicating the number and species of surviving seedlings in each survey plot should be produced.

iii. The report also shall describe the condition of applicable hydrology altering features (culverts), the general condition of the seedlings, and discuss likely causes for observed mortality (e.g., herbivory, drought, etc.) within those plots that did not exhibit a seedling survival rate as indicated by the success criteria.

iv. The report shall identify the generalized degree and location of exotic/noxious species colonization and identify measures that will be implemented to eradicate them.

2. CONTINUOUS MONITORING REPORTS

a. The plots established in paragraph 2a above will be utilized for continuous monitoring. All trees falling within the plot should be permanently tagged and numbered and the number, species and diameters of trees within each plot shall be recorded.

b. The report shall identify seedling survivorship and colonization by volunteer mid-story and overstory species. Also included in the report would be the results of the vegetation survey including visual estimates of percentage (%) of canopy, mid story and over story closure, % of canopy cover comprised of cypress and other species (differentiated), % canopy cover comprised by bald cypress, % exotic vegetation in each vegetation layer, survival rate of planted vegetation, and an estimate of natural regeneration in mid- and understory by species shall be included in the report.

c. The report must include a discussion of the general health or vigor of the planted trees.

d. The report must include a description of the overall condition of the entire mitigation area.

e. The report must include a description of observed wildlife usage.

f. The report must summarize the overall condition of the mitigation relative to the goals and success criteria.

g. The report must identify maintenance activities performed on mitigation lands.

h. The report must include a discussion of the measures used to control noxious/exotic species colonization/establishment.

3. SCHEDULE

a. Vegetative monitoring and reports shall be completed in the spring (when new growth makes identification practicable) of years 1, 2, 5, 7, 10, 15, and prior to and following the any thinning operation. Following the more intensive surveying of the first 10-year period, monitoring should be continued on a 5-year basis as previously described. For monitoring activities after year 20, the number of monitoring plots may be reduced to 50 percent of the original number of plots, if the mitigation success is proceeding as anticipated.

b. If the year 1 vegetative success criterion is obtained, but all performance standards have not been met in the 3rd and 5th year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).

c. Reports discussing measure to control exotic/noxious species shall be provided annually until such time as all initial success criteria and interim success criteria identified in the above sections have been met and documented in reports, and thereafter according to the schedule identified in 4(a) above. The annual reports should document items such as noxious/exotic species, method of treatment/control, machinery and/or chemical treatments utilized, timing of treatments/work, effectiveness of previous treatments/work, etc.

d. Monitoring reports will be submitted by December 31 of each monitoring year. Monitoring reports shall be provided to the Corps, the Service, EPA, and LDWF.

C. Contingency and Remedial Actions and Responsibilities

In the event monitoring reveals that initial success criteria have not been met, measures shall be taken to achieve those criteria in accordance with the following plan:

1. If survival is less than 50 percent per acre as determined by sampling or by observing high mortality at any location within the planted areas, or target species ratios are not met, replanting, monitoring and reporting, as previously described, shall occur as needed to achieve and document the required one-year survival rate.
2. If the survival criterion is not met after three unsuccessful attempts, the Corps, the Service, EPA, and LDWF will reassess the mitigation to determine whether the use of the mitigation area should be discontinued or if a new management potential should be calculated incorporating the new conditions.
3. Year 5 monitoring shall verify seedling composition and survivorship goals established in the above section. Remedial action, as deemed necessary to ensure attainment of year 5 survivorship and composition criteria shall be implemented.

III. PROPOSED STANDARDIZED ASSUMPTIONS FOR MARSH

A. Performance Standards

In order for the proposed project to be considered acceptable for mitigating wetland impacts, the site vegetation, soils, and hydrology shall be restored such that the site meets wetland criteria as described in the Corps 1987 Wetlands Delineation Manual. Additionally, the following criteria are applicable:

1. INITIAL SUCCESS CRITERIA

Initial placement of dredged material is completed and at least 80 percent of site is within "as-built" or initial construction elevation range (+2.5 feet NAVD88) as described in Individual Environmental Report (IER) 20.

2. YEAR THREE SUCCESS CRITERIA

a. After at least two full years following construction, no less than 90% of the marsh creation site is within the "functional marsh" elevation range (e.g., +1.0 feet NAVD88 to + 1.5 feet NAVD88).

b. At least 80% of the dredge material disposal area should be vegetated.

c. Containment dikes breached and tidal creeks constructed and functioning.

d. At least 80% of the vegetative cover are species classified as Facultative (FAC) or wetter, as verified by monitoring reports and verified by an interagency team if necessary.

3. YEAR FIVE SUCCESS CRITERIA

a. Five years after construction, at least 75% of the created marsh remains within the "functional marsh" target elevation range.

b. Demonstrated use of the created marsh area by estuarine-dependent marine fishery species (not just forage species) typical of that marsh type as shown by sampling on a quarterly basis during years four and five using cast nets and/or seines in open water within the project area.

c. Observed use of created marsh by wildlife species typically found in natural marsh habitats of similar salinity regime.

B. Reporting Protocols and Monitoring Plan

1. AS-BUILT REPORTS

The Corp / Local Sponsor will submit an As-Built Report to LDWF, NMFS, EPA, the Service, and the Louisiana Department of Coastal Management (CMD), and for each cell of the marsh creation feature within one year following completion of the work described in IER 20. The As-Built Report shall contain a survey providing the areal extent of the filled area and the settled grade of the dredged material and adjacent marsh areas.

2. MONITORING PROVISIONS

The Corps / Local Sponsor agrees to perform all necessary work to monitor the LPV mitigation remediation project (IER 20) to demonstrate compliance with the success

criteria established in this monitoring plan. The monitoring program shall follow the guidelines established below:

a. **Visual Description:** Visual descriptions shall be provided with each monitoring report by one of the following means.
   i. Photographs of each vegetation plot and hydrology monitoring station [permanent markers shall be established to ensure that the same locations (and view directions) are monitored in each monitoring period]; or,
   ii. One color aerial photograph (8" x 10" or larger) depicting the entire site. An aerial photograph should be taken once the site has been constructed, stabilized and planted (preferably in the 3rd or 5th year following completion of initial work).

b. **Hydrology:**
   i. Tidal influence shall be discussed using indicators of high and low tides referenced to a known datum.
   ii. The condition of the constructed tidal channels and ponds noting general flow characteristics, noting excessive scouring and/or silting in of channels.

c. **Vegetation:**
   i. The Corps / Local Sponsor shall establish survey plots along systematically spaced linear transects (approximately 20 transects for each marsh cell; perpendicular to the rock dike) at the time of construction, and shall conduct a survey of each tract at or near the end of the first growing season. Surveys shall be conducted in accordance with an accepted academic or industrial sampling methodology (e.g. Steyer et. al. 1995). The Corps / Local Sponsor shall establish one-hundredth-acre permanent continuous monitoring plots that account for at least 2 % of the total created marsh area The Sponsor shall document the species and percentage coverage by species within each plot. The Sponsor will begin monitoring the continuous monitoring plots and submit monitoring reports to LDWF, NMFS, EPA, the Service, and CMD at required intervals.
   ii. The Sponsor shall provide a written report to LDWF, NMFS, EPA, the Service, and CMD that describes the developing vegetative communities developing within the marsh creation cells by determining:
      - Dominant vegetation species;
      - A coverage assessment;
      - The number and species rated FAC or wetter (excluding FAC-) growing in wetlands (total and #/acre);
      - The percentage of dominant species FAC or wetter (excluding FAC-); and
      - An invasive/noxious species assessment.
   iii. The report shall describe the general condition of the vegetation, and discuss likely causes for any observed mortality.

d. **Site Elevation:** The Corps / Local Sponsor shall provide a topographic survey with elevations shot along the transect lines established for determining vegetation cover and species composition. Surveys should be included in monitoring reports for years 1, 3, 5, 10, 20, 30, 40, and 50.

e. **Timing:**
   i. Monitoring shall be conducted during the growing season following years 1, 3, 5, 10 and every 10 years thereafter for 50 years.
   ii. Monitoring for the first year or any year following construction shall take place between August and October;

3. **MONITORING REPORTS**
   a. Upon achievement of the initial success criteria, the Corps / Local Sponsor shall document the results of his monitoring in a report submitted to LDWF, NMFS, EPA, the Service, and CMD. Additional reports will be submitted following years 3, 5, 10, 20, 30, 40 and 50.
   b. The reports shall contain a description of the conditions of the mitigation project relating those conditions to the success criteria and shall contain the following:
      i. An aerial photograph (only in report submitted after the 3rd or 5th year) taken during the growing season, depicting a completed tract of the mitigation project with the photo date and approximate scale noted.
      ii. Ground level photographs.
      iii. A detailed narrative summarizing the condition of the mitigation project and all regular maintenance activities.
      iv. A drawing based upon the site plan that depicts topography, sampling plots and permanent photo stations.
      v. Results of tidal monitoring, including mean high and low water elevations.
      vi. Results of vegetation survey including visual estimates of percentage (%) overall cover and % cover by each species, % exotic vegetation, total % "facultative" and total % "upland" species in each vegetation layer, survival rate of planted vegetation (if planted), an estimate of natural re-vegetation, and a qualitative estimate of plant vigor as measured by evidence of reproduction.
      vii. If Year 1 success criteria is obtained, but all performance criteria have not been met in the 3rd year, a monitoring report shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (i.e., that corrective actions were successful).
      viii. Reports will be submitted by December 31 of each monitoring year.
      ix. Monitoring reports shall be provided to LDWF, NMFS, EPA, the Service, and CMD and made available to other members of the natural resource agencies upon request.

C. Contingency and Remedial Actions and Responsibilities

In the event monitoring reveals that initial success criteria have not been met, the Corps / Local Sponsor shall take measures to achieve those criteria in accordance with the following plan:

1. **FILL MATERIAL ELEVATIONS AND AREA**
   a. Should the initial placement of dredged material not meet the 80% target construction elevation or areal coverage, the Corps / Local Sponsor shall either deposit additional

dredged material or redistribute existing material as necessary to achieve the target percentage and areal coverage.

b. At year 5, if less than 75% of the marsh creation area contains emergent vegetation (at least 50% of which have a FAC or wetter designation), then the Local Sponsor may be required, at the discretion of the natural resource agencies, to deposit and plant (according to their specifications) additional dredged material. Should the agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with, and with their approval.

c. From years 6 through 20, if less than 50% of the marsh creation area contains emergent vegetation (at least 50% of which have a FAC or wetter designation), then the Sponsor may be required, at the discretion of the natural resource agencies, to deposit additional dredged material and plant these areas (according to their specifications) so that the extent of marsh coverage is at minimum 50% at year 20. Should the agencies decide that such measures are necessary, the location and extent of fill placement and vegetative plantings will be determined in consultation with, and with their approval.

2. **VEGETATIVE PLANTINGS**

a. If vegetative plantings survival is less than 50 percent per acre as determined by sampling or by observing high mortality at any location within the planted tract, the Sponsor shall take appropriate actions, as recommended by the natural resource agencies, to address the causes of mortality and shall replace all dead plantings during the following planting season. Replanting and monitoring and reporting, shall occur as needed to achieve and document the required one-year survival rate. If the survival criterion is not met after a second unsuccessful attempt, the Corps / Local Sponsor will convene a meeting to decide if replanting should continue. Should the natural resource agencies determine that achieving the required survival rate would not be likely, the Sponsor shall be required to provide replacement mitigation for the increment of value that did not accrue within the unsuccessful tracts within one year of this decision. In addition, the natural resource agencies will reassess the created marsh to determine if a new management potential should be calculated incorporating the new conditions.

b. Year 5 monitoring shall verify vegetation composition and survivorship goals. The Sponsor shall implement remedial action, as deemed necessary by the natural resource agencies, to ensure attainment of Year 5 survivorship and composition criteria.

D. Long-term Maintenance and Protection

The Sponsor, or its heirs, assigns or purchasers shall be responsible for protecting lands contained within the mitigation project area in perpetuity, unless bank lands are transferred or sold to a state or federal resource agency or non-profit conservation organization. The conservation servitude shall incorporate this mitigation monitoring plan by reference and bind the Sponsor, its heirs, assigns, and future owners to complying with the terms of this copy of the mitigation monitoring plan. A copy of the conservation servitude to be filed in the real estate records of the Mortgage and Conveyance Office for the parish in which the site is located and shall be provided to the Corps for review and approval prior to filing. After filing, a copy of the recorded conservation servitude, clearly showing the book, page and date of filing, will be provided to LDWF, NMFS, EPA, the Service, and CMD.

APPENDIX B
MITIGATION PRIORITY AREAS

The Service has identified priority areas for potential mitigation sites along the west and east sides of the Mississippi River. Some areas proposed below are proposed projects under the Coastal Wetlands Planning Protection and Restoration Act (CWPPRA) program that have not yet been selected for construction funding. The remaining areas are either proposed projects by other entities or contain sufficient acreage to satisfy the mitigation needs of the proposed project.

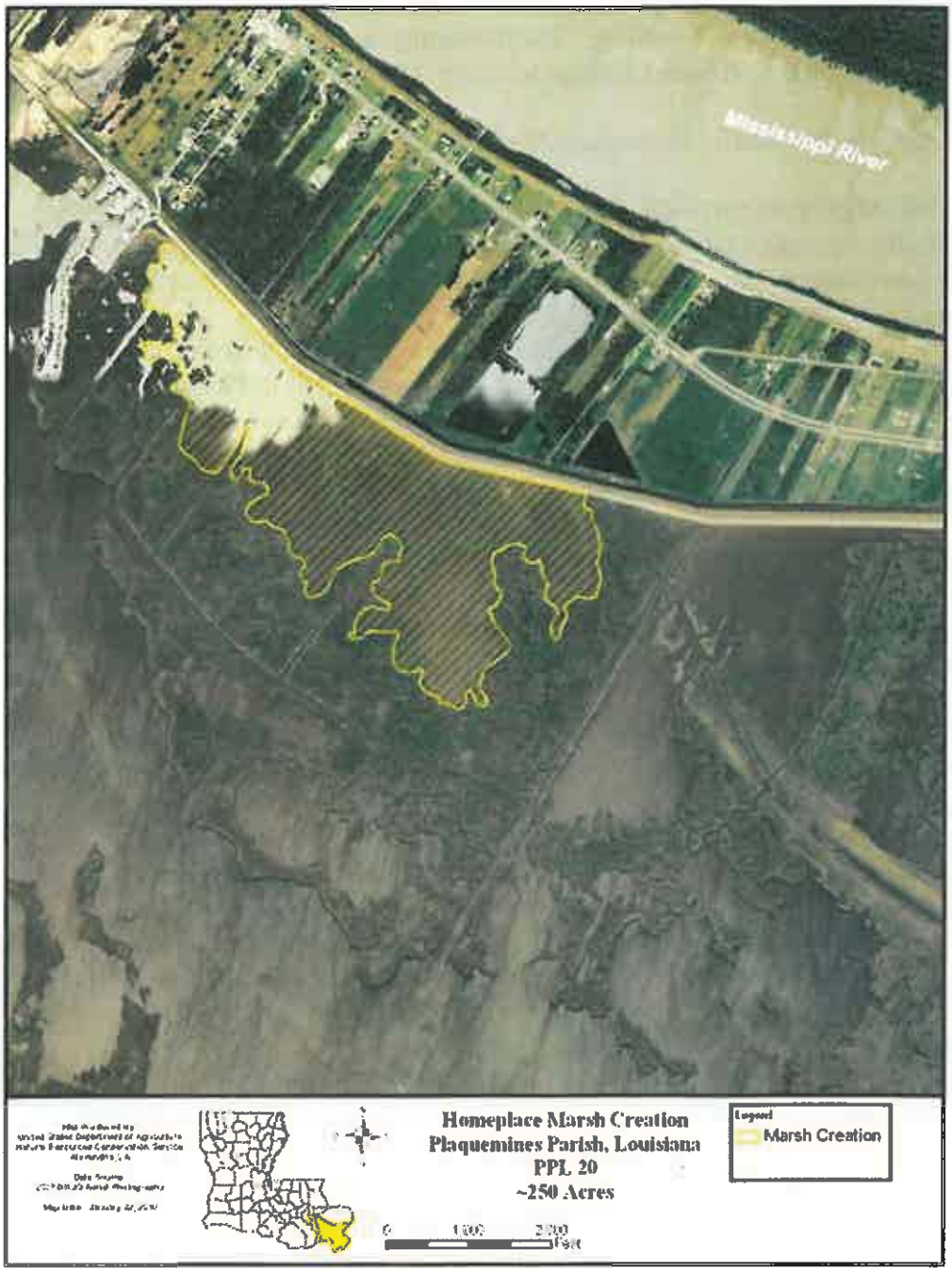
I. AREA/PROJECT NAME: Homeplace Marsh Creation

PPL20 PROJECT NOMINEE FACT SHEET, March 30, 2010
Coast 2050 Strategy: Coastwide Strategy: dedicated dredging for wetland creation.
Project Location: Region 2, Barataria Basin, Plaquemines Parish, near Homeplace, west of hurricane protection levee.
Problem: The marsh located between the hurricane protection levee and Bay Lanaux / Bay de la Cheniere is severely degraded; the lack of healthy marsh at this location poses a threat to the hurricane protection levee. The proposed marsh creation / marsh nourishment will help protect the levee. What evidence is there for the nature and scope of the problem in the project area? 2008 aerial imagery confirms the deteriorated of marsh west of the hurricane protection levee.
Goals: Create 215 acres and nourish 35 acres of marsh between the hurricane protection levee and Bay Lanaux / Bay de la Cheniere. The proposed marsh creation and nourishment will help protect the levee.
Proposed Solution: 215 acres of marsh creation and 35 acres of marsh nourishment. Material for marsh creation and nourishment will be excavated from the Mississippi River.
Preliminary Project Benefits:

1. What is the total acreage benefited both directly and indirectly? 250 acres
2. How many acres of wetlands will be protected/created over the project life? Estimated 203 net acres at end of 20 years.
3. What is the anticipated loss rate reduction throughout the area of direct benefits over the project life (<25%, 25-49%, 50-74% and >75%). 50% reduction in land loss rate (marsh creation/nourishment).
4. Do any project features maintain or restore structural components of the coastal ecosystem such as barrier islands, natural or artificial levee ridges, beach and lake rims, cheniers, etc. The created and nourished marsh will help re-establish the hydrologic function of the former Bayou de la Cheniere ridge.
5. What is the net impact of the project on critical and non-critical infrastructure? The created/nourished marsh will reduce the fetch west of the hurricane protection levee.
6. To what extent does the project provide a synergistic effect with other approved and/or constructed restoration projects? The project will complement other efforts to establish / nourish marshes west of the Mississippi River – Mississippi River Sediment Delivery-Bayou Dupont; West Bay Sediment Diversion, Lake Hermitage Marsh Creation, West Point a la Hache Marsh Creation.

Identification of Potential Issues: The proposed project has the following potential issues: no issues presently identified.

Preliminary Construction Cost: The estimated construction cost including 25% contingency is $22,786,140. The fully-funded cost range is $30M - $35M.
Preparer of Fact Sheet: Quin Kinler, USDA-NRCS, 225-382-2047, quin.kinler@la.usda.gov.

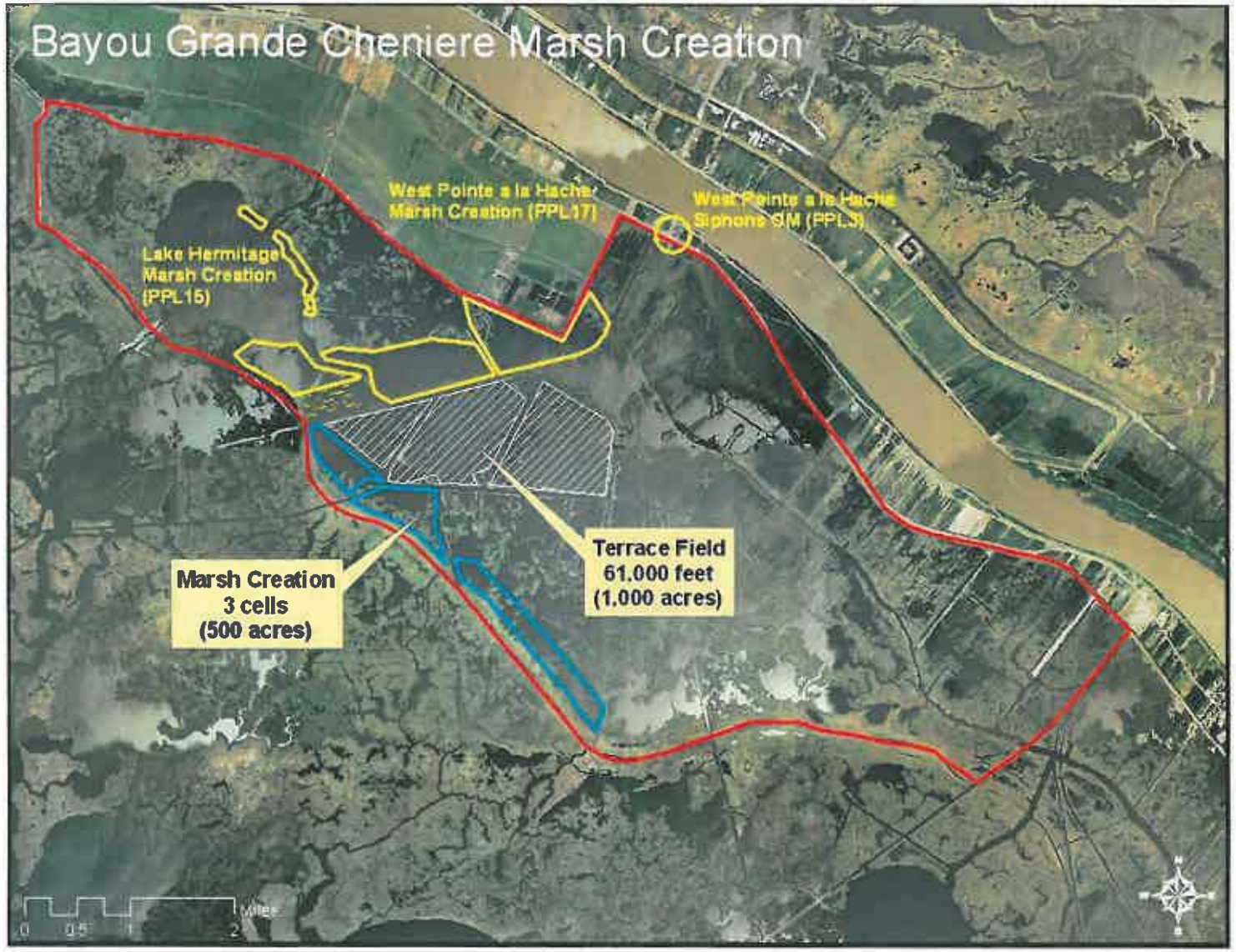


II. AREA/PROJECT NAME: Bayou Grand Cheniere Marsh Creation

PPL20 PROJECT NOMINEE FACT SHEET, January 28, 2010
Coast 2050 Strategy: Coastwide – dedicated dredging to create, restore, or protect wetlands; Coastwide – utilize off-shore and riverine sand and sediment resources.
Project Location: Region 2, Barataria Basin, Plaquemines Parish, near Lake Hermitage, along Bayou Grande Cheniere ridge.
Problem: From 1932 to 1990, the West Point a la Hache Mapping Unit lost 38% of its marsh. Through 2050, 28% of the 1990 marsh acreage is expected to be lost. That loss is expected to occur even with operation of the West Point a la Hache Siphons. Significant marsh loss has occurred south of Lake Hermitage with the construction of numerous oil and gas canals.
Goals : The primary goal is to re-create marsh habitat in the open water areas and nourish marsh along the eastern side of the Bayou Grande Cheniere ridge. Terraces are proposed to reduce fetch in large open water bodies and to capture suspended sediment delivered via the West Pointe a la Hache siphons.
Proposed Project Features: (1) Riverine sediments will be hydraulically dredged and pumped via pipeline to create approximately 500 acres of marsh in the project area. (2) Approximately 60,000 linear feet of terraces (50 acres) will be constructed to reduce fetch and turbidity and capture suspended sediment.
Preliminary Project Benefits:

1. The total acreage benefited directly would be 550 acres (500 acres of marsh creation/nourishment and 50 acres of terraces). Indirect benefits would occur to the Bayou Grand Cheniere ridge and within the 1,000-acre terrace field.
2. The total net acres protected/created over the project life would be between 400-500 acres.
3. Background loss rates would be reduced by 50% in the marsh creation and marsh nourishment areas.
4. The project would help maintain the Bayou Grande Cheniere ridge.
5. The project would not protect any significant infrastructure.
6. The project would provide a synergistic effect with the Lake Hermitage Marsh Creation Project (PPL15), the West Pointe a la Hache Marsh Creation Project (PPL17), and the West Pointe a la Hache Siphon Enhancement Project (PPL3). All of these projects would work in conjunction to restore wetlands within the Lake Hermitage Basin.

Identification of Potential Issues: Numerous oil and gas canals; borrow site.
Preliminary Construction Costs: Preliminary construction costs are estimated at $25 million, which includes 25% contingency.
Preparer of Fact Sheet: Kevin Roy, USFWS, (337) 291-3120, kevin_roy@fws.gov.


Bayou Grande Cheniere Marsh Creation
West Pointe a la Hache Marsh Creation (PPL17)
West Pointe a la Hache Siphons SM (PPL3)
Lake Hermitage Marsh Creation (PPL15)
Marsh Creation 3 cells (500 acres)
Terrace Field 61,000 feet (1,000 acres)
0 0.5 1 2 Miles

III. AREA/PROJECT NAME: Plaquemines Parish Coastal Restoration Project

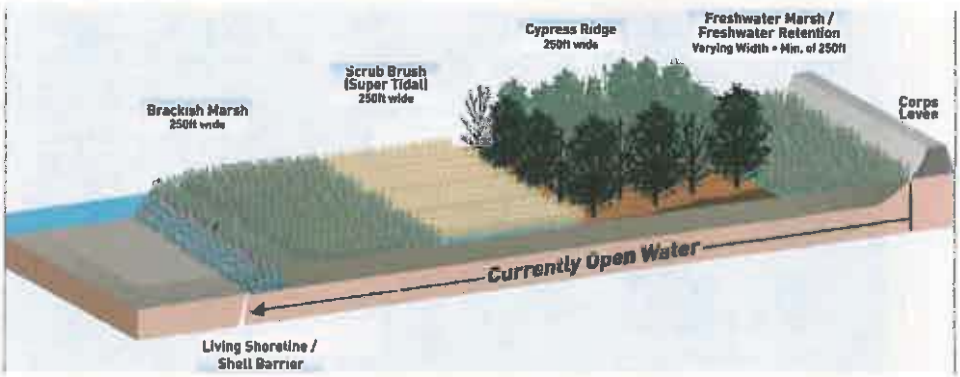
Option A – Open Water Reduction - Development of a stabilized shoreline and wetland vegetation (brackish marsh, Scrub Brush, and Cypress Ridge) westward of the existing brackish marsh.

The major advantage of this alternative is that it minimizes any negative impact on the existing marsh. The major disadvantage is the construction cost.

In summary, Option A provides for the protection of approximately 2,800 acres of marsh through the development of a new shoreline and creation of transitional wetland vegetation (brackish marsh, Scrub Brush ridge and cypress ridge) immediately east of the "living shoreline." The new protected shoreline also encloses Areas 1, 2 and 3, providing the potential for development of mitigation land banks for development of freshwater marshes in these areas.

Option A

Cross-section



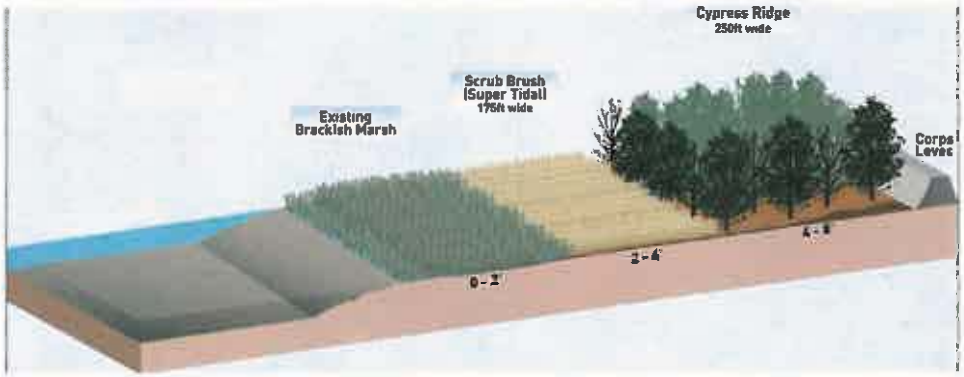
Oblique View

Option B – Brackish Marsh Stabilization - Development of two wetland vegetation ridges (Scrub Brush Ridge and Cypress Ridge) immediately adjacent to the back levee system for Reach B-2 and the enrichment of the existing brackish marsh immediately west of the these two ridges. This project provides stabilization to the existing brackish marsh through enrichment with freshwater nutrients and sediment from the Mississippi River plus infilling of the open water areas that currently penetrate the brackish marsh, and establishes transitional wetland vegetation between the brackish marsh and the Reach B-2 back levee.

While his project converts 335 acres of brackish marsh into Scrub Brush and Cypress ridges, the impact is offset by the creation of new brackish marsh through the infilling of open water, the enrichment of existing marsh, and the development of additional wetland habitat.

Option B

Cross-section



Oblique View

Plaquemines Parish
Coastal Restoration Alternatives for Reach B-2

	Open Water Eliminated (Acres)	Brackish Marsh Impacted (Acres)	Brackish Marsh Marsh Created (Acres)	0 - 2 MSL Brackish Enriched (Acres)	2 - 5 MSL Scrub Brush Ridge Created (Acres)	5 - 8 MSL Cypress Ridge Created (Acres)	Construction Cost ($000)	Mitigation Cost ($000)
Option A Open Water Reduction	* 1,380	0	240	0	240	240	$ 230,000	$ -
Option B Brackish Marsh Stabilization	660	335	** 310	158	138	197	$ 27,000	$ 18,000

* This figure assumes the 582 Acres of open water within the new shoreline is eventually filled-in through Mitigation Land Bank; however, the cost is not in this project

** This figure assumes the in-filling of Areas 1 and 2 only

Regulation: The policy of the Corps of Engineers is that they can permit existing wetlands to be destroyed only if an equal, or greater, area of the same wetland type is created or restored elsewhere.

Impact: In Option B, we are impacting 335 acres of marsh with fill above 2 feet.

Mitigating actions:

1. 310 Acres of open water (Areas 1 and 2) will be filled and in-kind marsh will be created. Because this is "new" versus "established" marsh, the new, in-kind marsh is discounted by 25% (providing .75 acre credit for each acre of new marsh created)
2. 197 Acres of existing marsh is being enriched with freshwater sediment from the river. A 10% factor is given for the enrichment of these 197 acres.
3. 138 Acres of Scrub Brush (or other appropriate vegetation) will be planted on a 175 Ft. wide ridge between 2 and 4 feet in elevation. The value of the wetland acreage developed by this ridge is assumed to be only 1/3 of the value of the existing marsh
4. 197 Acres of Cypress will be planted on a 250 Ft. wide ridge approximately 5 Ft. in elevation. The value of this ridge is assumed to be only 1/4 of value of the existing marsh.

Assuming the discounts identified above, the project as proposed in Option B will produce 803 acres of wetland, however, when factoring in the values described above the wetland replacement value is 343 acres – still in excess of the 335 acres impacted by the improvements proposed in Option B

Option B Mitigation Alternatives

Area 1

100	Acres
3.9	Ft. Deep
16,552,800	CF
613,067	CY
$ 5.75	CY Cost of Fill
$ 3,525,133	Fill Cost

	Marsh Impacted (Acres)	In-Kind Marsh Created (Acres)	In-Kind Marsh Enriched (Acres)	Scrub Brush Ridge Created (Acres)	Cypress Ridge Created (Acres)	Project Total Credit Value (Acres)
	333	100	158	158	197	993
Comparative Value:		75%	10%	33%	25%	Acres of Wetland Post-Project
		75	16	46	49	185.99 Acres of Wetland Habitat Credits

Area 2

210	Acres
9.5	Ft. Deep
77,754,600	CF
2,875,800	CY
$ 5.75	CY Cost of Fill
$ 16,538,850	Fill Cost

	Marsh Impacted (Acres)	In-Kind Marsh Created (Acres)	In-Kind Marsh Enriched (Acres)	Scrub Brush Ridge Created (Acres)	Cypress Ridge Created (Acres)	Project Total Credit Value (Acres)
	335	810	158	155	197	808
Comparative Value:		75%	10%	33%	25%	Acres of Wetland Post-Project
		212.5	16	46	49	843.06 Acres of Wetland Habitat Credits

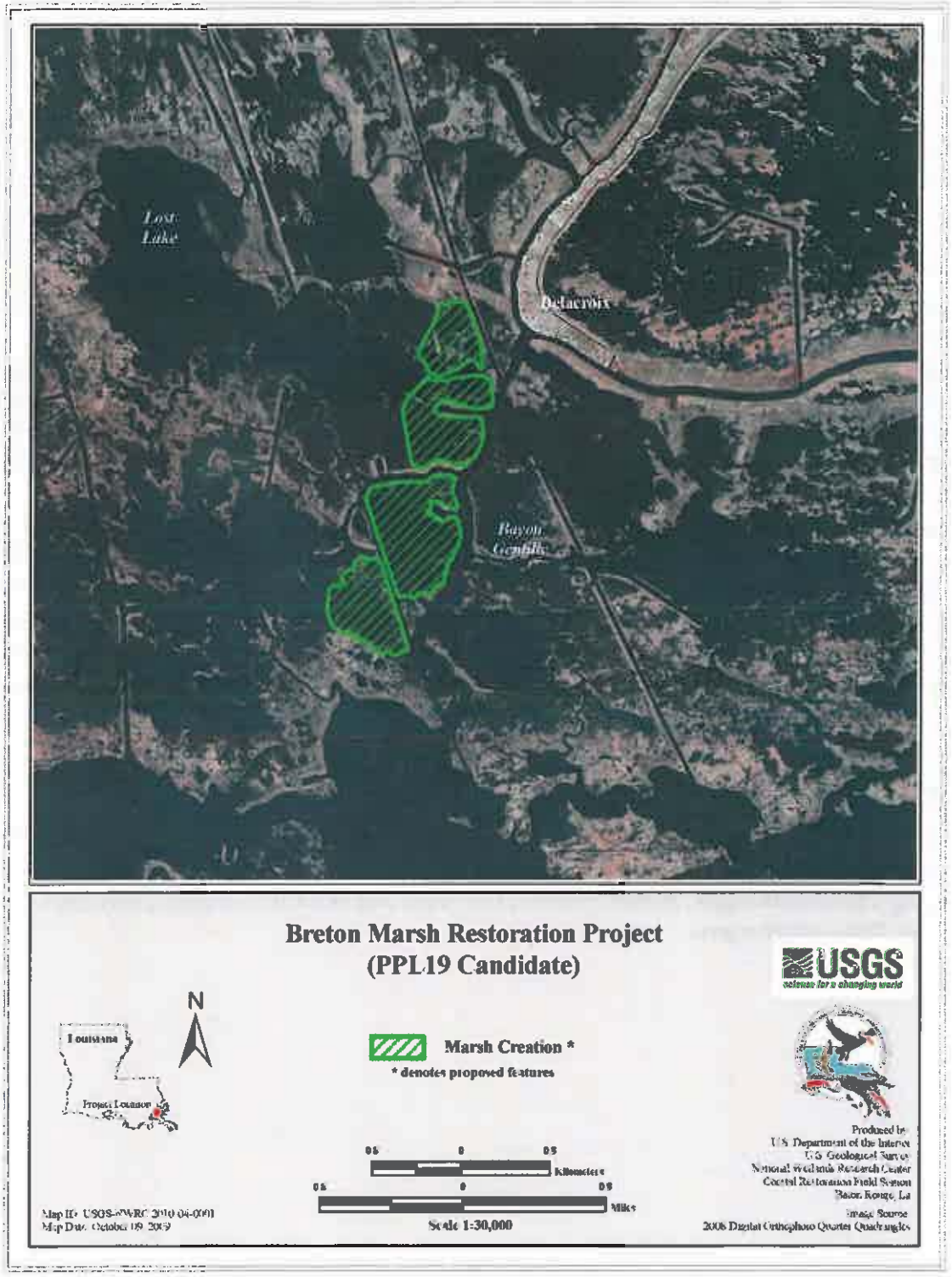
Area 3

272	Acres
15.5	Ft. Deep
183,648,960	CF
6,801,613	CY
$ 5.75	CY Cost of Fill
$ 39,110,427	Fill Cost

	Marsh Impacted (Acres)	In-Kind Marsh Created (Acres)	In-Kind Marsh Enriched (Acres)	Scrub Brush Ridge Created (Acres)	Cypress Ridge Created (Acres)	Project Total Credit Value (Acres)
	335	582	158	155	197	1,075
Comparative Value:		75%	10%	50%	50%	Acres of Wetland Post-Project
		436.5	16	69	99	619.8 Acres of Wetland Habitat Credits

IV. AREA/PROJECT NAME: Breton Marsh Restoration Project

PPL19 PROJECT NOMINEE FACT SHEET, November 10, 2009
Coast 2050 Strategy: Coastwide Strategy: dedicated dredging, to create, restore, or protect wetlands.
Project Location: The project area is located in Region 2, Breton Basin, Plaquemines Parish, southeast of Delacroix, LA.
Problem: A major cause of loss in the Region 2, Caernarvon Mapping Unit has been storm related. Prior to Katrina the greatest land loss (6,560 acres) occurred from 1956-1974 and coincided with Hurricane Betsy and extensive canal building. It is estimated that 40.9 square miles of marsh were converted to open water in the Breton Sound Basin as a result of Hurricane Katrina in 2005. Land loss rates for this area are currently estimated at –2.5%/year based on USGS data from 1985 to 2006.
Goals: The goal of this project is to restore marsh that was damaged by Hurricane Katrina in 2005. Reestablishing this marsh will help to restore the western shoreline of Bayou Gentilly and moderate the effects of the brackish waters from the Black Bay system moving north into the more intermediate marshes. Initial project construction includes the creation of 337 acres and nourishment of 99 acres of brackish marsh.
Proposed Solution: Approximately 337 acres of marsh will be restored and 99 acres of marsh will be nourished through hydraulic dredging. It is estimated that 1.6 million cubic yards of material would be dredged hydraulically from Lake Lery and pumped via pipeline to create marsh. Dredged material would be pumped into containment dikes to achieve an average height of 1.4 feet NAVD 88. Tidal creeks will be constructed prior to placement of dredge material and retention levees would be gapped for estuarine fisheries access and to achieve a functional marsh.
Project Benefits: The project would benefit 436 acres of brackish marsh and open water. Approximately 275 acres of brackish marsh would be created/protected over the 20-year project life.
Preliminary Construction Costs: The total fully-funded cost for the project is $ 14,599,655.
Preparer(s) of Fact Sheet: Angela Trahan, U.S. Fish and Wildlife Service, (337) 291-3137, Angela_Trahan@fws.gov; Robert Dubois, U.S. Fish and Wildlife Service, (337) 291-3127, Robert_Dubois@fws.gov.


Lost Lake
Delacroix
Bayou Gentilly
Breton Marsh Restoration Project
(PPL19 Candidate)
USGS
science for a changing world
N
Louisiana
Project Location
Marsh Creation *
* denotes proposed features
Kilometers
Miles
Scale 1:30,000
Produced by:
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, La
Image Source:
2008 Digital Orthophoto Quarter Quadrangles

V. AREA/PROJECT NAME: Dedicated Sediment Delivery and Water Conveyance for Marsh Creation near Big Mar

PPL19 PROJECT NOMINEE FACT SHEET

Coast 2050 Strategy: Coastwide Strategy: dedicated dredging to create, restore, or protect wetlands.

Project Location: Region 2, Breton Sound Basin, Plaquemines Parish, the marsh creation is located along the western shoreline of Lake Lery and the conveyance channel is located within Big Mar.

Problem: The upper Breton Sound marshes have long been subjected to subsidence, salt water intrusion, altered hydrology, and storm damage. After the passing of Hurricane Katrina in 2005, the Breton Sound marshes were devastated and land loss rates increased in the upper sound from 0.69%/yr to 1.74%/yr (USGS). The Caernarvon Freshwater Diversion Project is helping to reverse land loss in this area; however, as Big Mar fills in, flow that used to go down Delacroix Canal and into the marshes southwest of Big Mar is now mostly taking the path of least resistance into Lake Lery. Furthermore, the shoreline of Lake Lery is almost indistinguishable where the lake is coalescing with hundreds of acres of open water. Reestablishment of the Breton Sound marshes is dependent upon the direct reconstruction of lost marsh, reestablishing the lake rim, and optimizing the flow and outfall of the Caernarvon structure.

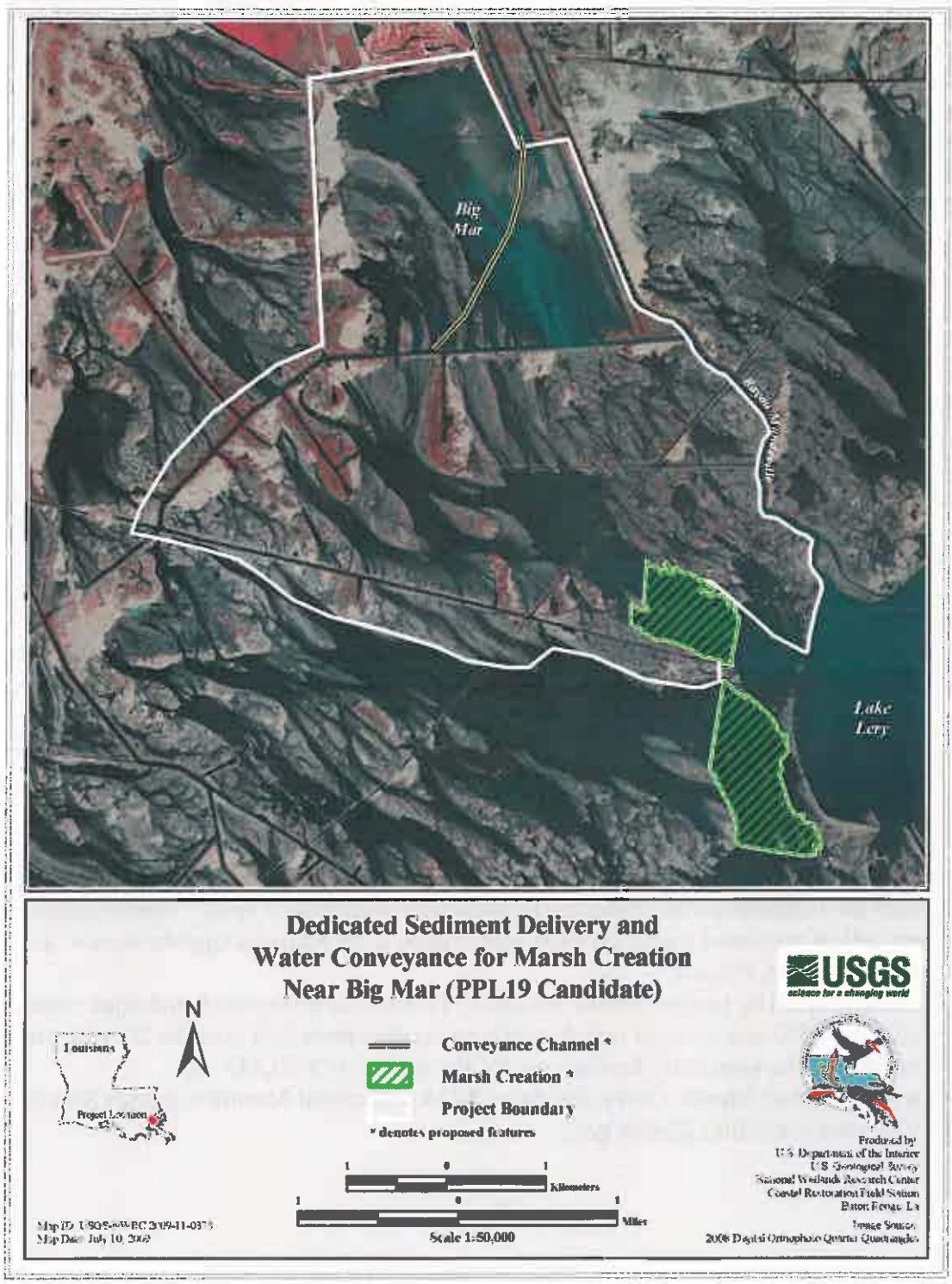
Goals: Project goals include: 1) creating approximately 434 acres of fresh to intermediate marsh via dredging the center of Lake Lery, 2) excavating a channel 7,850-foot-long, 75 feet bottom width, and 7 feet deep through the Big Mar to facilitate Caernarvon outfall to 6,300 acres of marshes west and southwest of Big Mar, and 3) reducing the loss rate of adjacent interior marshes.

Proposed Solution: Project features include approximately 434 acres of marsh creation via dredging from Lake Lery. In addition, a 7,850-foot-long conveyance channel would be dredged from the northeast confluence of Caernarvon Canal and Big Mar to near the southwest corner of Big Mar where it joins with Delacroix Canal. The excavated material will be beneficially used to build marsh in the Big Mar. Construction of this channel will help redirect flow from the Caernarvon diversion to the southwest wetlands of upper Breton Sound. The southern cell of proposed marsh creation would need to be adjusted slightly west to avoid an approved CWPPRA Project.

Project Benefits: The project would benefit 6,311 acres of fresh marsh and open water. Approximately 853 net acres of marsh would be created/protected over the 20-year project life.

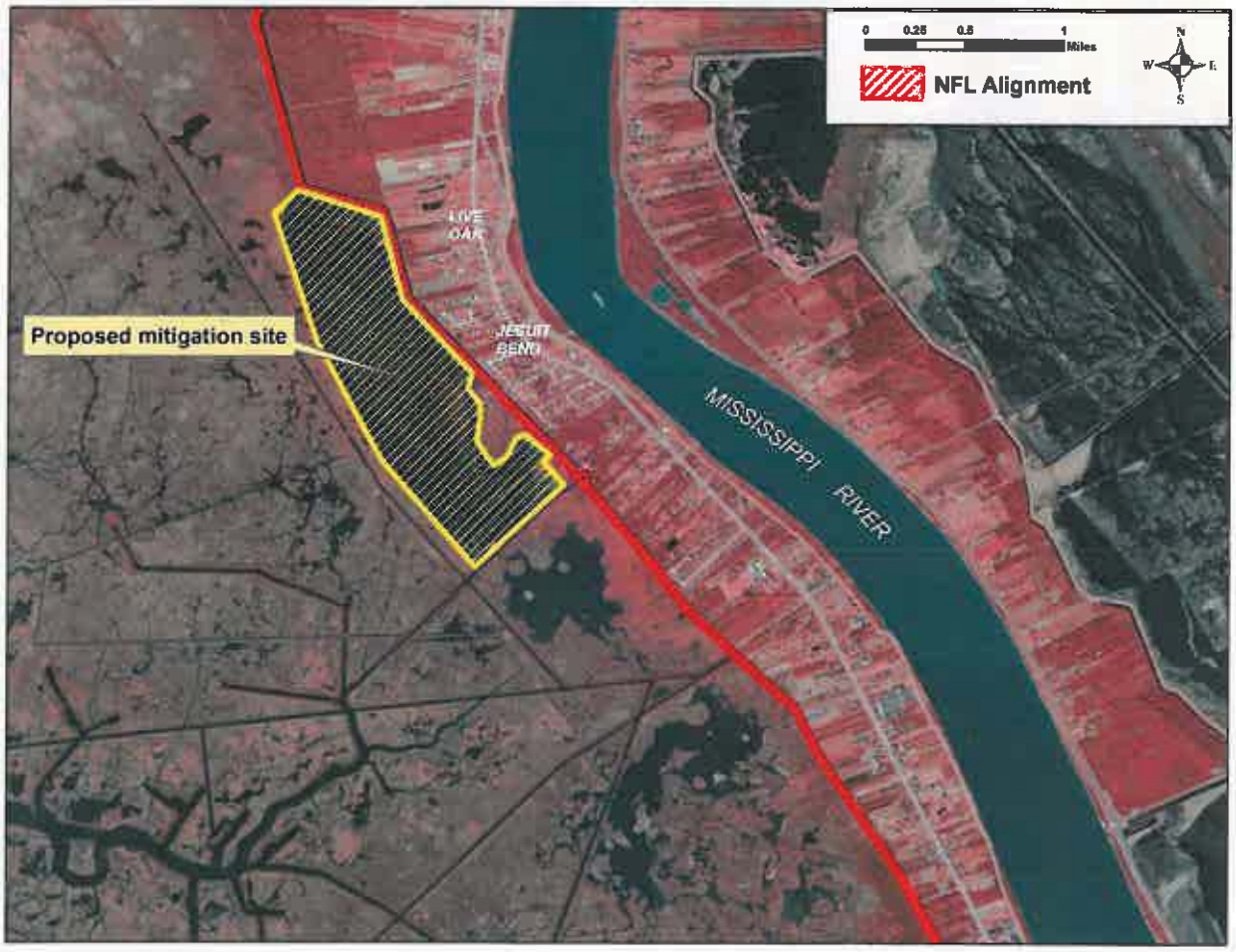
Project Costs: The total fully funded cost for the project is $ 20,443,392.

Preparer(s) of Fact Sheet: Cheryl Brodnax, NOAA National Marine Fisheries Service, (225) 578-7923, cheryl.brodnax@noaa.gov.


Big Mar
Lake Lery
Dedicated Sediment Delivery and
Water Conveyance for Marsh Creation
Near Big Mar (PPL19 Candidate)
USGS
science for a changing world
N
Louisiana
Project Location
Conveyance Channel *
Marsh Creation *
Project Boundary
* denotes proposed features
Kilometers
Miles
Scale 1:50,000
Produced by
U.S. Department of the Interior
U.S. Geological Survey
National Wetlands Research Center
Coastal Restoration Field Station
Baton Rouge, La
Image Source:
2008 Digital Orthophoto Quarter Quadrangles

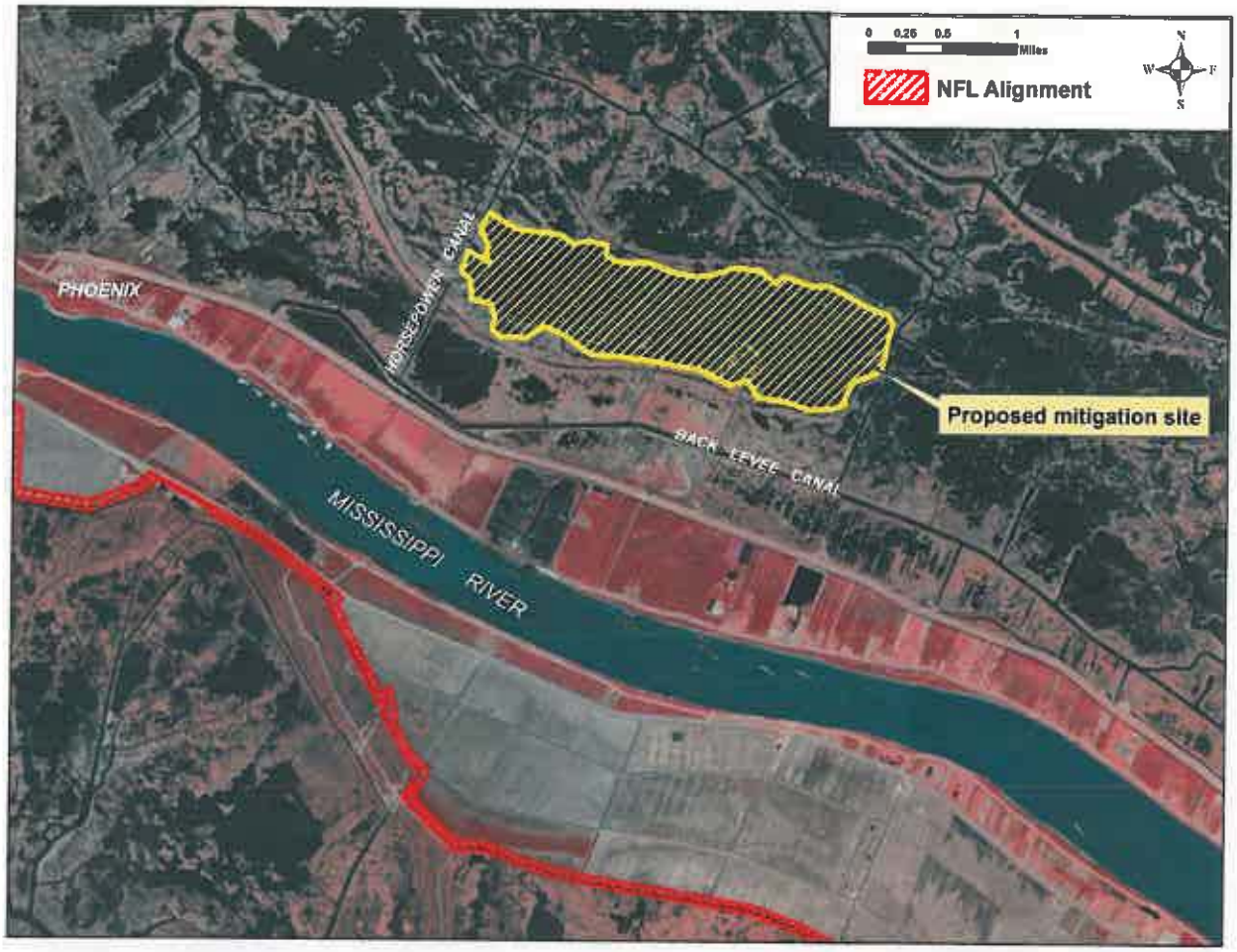
VI. Other Potential Areas for Creation of Bottomland Hardwood Forest, Swamp, and/or Marsh

A. **Jesuit Bend Site**, approximately 667 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the western edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). Once vegetation is established, the levees on the west end of the open-water area could be graded down or gapped to allow water to flow naturally through the created wetland system.



B. **Phoenix Site**, approximately 74 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the eastern edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). Once vegetation is established, the levees on the east end of the open-water area could be graded down or gapped to allow water to flow naturally through the created wetland system.

C. **Horsepower Canal Site**, approximately 1,251 acres:
Sediment could be pumped from the Mississippi River to create marsh. The lack of levees in the area would allow water to flow naturally through the created wetland system.



D. **Belair Site**, approximately 538 acres:
Sediment could be pumped from the Mississippi River to create bottomland hardwood forest and/or swamp adjacent to the nonfederal system and to create marsh on the eastern edge of the forested habitat (similar to the project proposal listed above in Section III of this Appendix). The lack of levees in the area would allow water to flow naturally through the created wetland system.

APPENDIX C
COASTAL ZONE MANAGEMENT

CONSISTENCY DETERMINATION

Louisiana Coastal Use Guidelines

New Orleans to Venice Non-Federal Levee
Plaquemines Parish, Louisiana

INTRODUCTION

Section 307 of the Coastal Zone Management Act of 1972, 16 U.S.C. 1451 *et seq.* requires that "each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs." In accordance with Section 307, a Consistency Determination has been prepared to evaluate the potential impacts associated with upgrading and incorporating the New Orleans to Venice non-federal storm surge protection levee into the federal levee system. Coastal Use Guidelines were written in order to implement the policies and goals of the Louisiana Coastal Resources Program (LCRP), and to serve as a set of performance standards for evaluating projects. Compliance with the LCRP, and therefore, Section 307, requires compliance with applicable Coastal Use Guidelines.

PURPOSE AND NEED FOR THE PROPOSED ACTION

On 29 August 2005, Hurricane Katrina caused major damage to the Federal and non-Federal flood control projects in southeast Louisiana. Since the storm, the U.S. Army Corps of Engineers (USACE) has been working with state and local officials to restore or improve the Federal and non-Federal flood control projects and related works in the affected area.

The Non-Federal Levee (NFL) was constructed with non-federal funds on the west side of the Mississippi River, in between River miles 47.0 and 70.5, to provide hurricane flood protection from Oakville to St. Jude. The NFL system is operated and maintained by private landowners and the Plaquemines Parish West Bank Levee District (PPWBLD). The PPWBLD also is responsible for most of the pump stations, floodgates, control structures, canals, and a number of freshwater siphons within the Plaquemines Parish protected area.

The NFL has settled and degraded to various degrees; the northern portion is in better condition and at higher elevations than the southern portion. The average grade elevation of the existing levee varies from approximately 8 ft on the northern end to about 3 ft in some reaches on the southern end. Approximately 24 miles of the alignment are at elevation 3-feet or less and nearly 2 miles of the project are at ground level. Because the grade elevation varies and differs by as much as five feet, and recent hurricanes have degraded certain reaches, the current level of protection is of low reliability.

The non-Federal sponsor, the Louisiana Office of Coastal Protection and Restoration (OCPR), seeks to integrate the NFL into the existing Federal Hurricane Storm Damage and Risk Reduction System (HSDRRS) that protects portions of Plaquemines Parish. Recent Congressional legislation calls for the USACE to upgrade and incorporate into the Federal levee system, approximately 32 miles of the NFL and reconstruct two miles of earthen levee from ground level. The completed upgrade of the NFL would protect residents, property, and Highway 23 in Plaquemines Parish against the Standard Project Hurricane (SPH) level event. Highway 23 is the major evacuation route from Venice north to New Orleans.

DESCRIPTION OF THE PROPOSED ACTION

The NFL project is divided into five distinct levee reaches and for planning purposes labeled 1, 2, 3, 4 and 5 (Figure 1). The existing NFL alignment follows a winding path through the west bank of Plaquemines Parish and is bordered by residential property, developed and undeveloped agricultural land, and sensitive environmental habitat. The USACE developed and evaluated more than 20 alternative alignments to the NFL to minimize impacts to the human and/or natural environment. In some areas, private property was either excluded from the protection or severed by a proposed alignment. Alternative construction methods were also considered, such as T-walls or I-walls, in order to maintain the existing alignment and avoid adverse impacts.

Section 1 is the northern terminus of the existing NFL at Oakville, south of Belle Chasse, and extends 7 miles south to La Reussite (Figure 2).

Section 2 would connect to Section 1 at La Reussite and extend 11 miles south to Myrtle Grove (Figure 3).

Section 4 would connect to Section 2 at Myrtle Grove and continue 3 miles south to Citrus Lands before extending an additional 8 miles south to Point Celeste (Figure 4). Note: Initially, Section 4 was separated into two sections titled “Section 3” and “Section 4”. Due to the relatively small size of “Sections 3 and 4”, these two portions of the levee were combined a renamed Section 4 for planning and design purposes. Hence, there is no “Section 3”.

Section 5 would connect to Point Celeste and extend 3 miles to connect with the NOV federal levee near St. Jude (Figure 5).

Clean, earthen borrow material 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 12 feet total height (up to 13.5 feet to allow for soil compaction). The use of borrow material from agricultural land would minimize impacts to environmentally sensitive areas. Typical earthen materials used for levee construction consist of low organic clays, fertilizer, seed, mulch, and water, reinforced high-strength geotextile fabric or deep soil mixing to strengthen the levee, low strength geotextile filter fabric for silt fences, plastic or steel hog wire for safety fences, steel or wood posts for silt and safety fences, crushed stone for surfacing and riprap for wave erosion prevention. Deep soil mixing involves blending a binder such as lime, cement, and slag into the soil to improve the competency of the soil. Stone armoring may

be used at certain locations to protect the levee from erosion and scour. Armoring locations include transition points, flood walls, pump stations, and utility pipeline crossings.

Approximately 1,194 acres will be required to complete the levee improvements detailed in the proposed action. Of these 1,194 acres, approximately 344 acres of these impacts are classified as wetland areas of various cover types (Table 1).

Cover Type	Acres Impacted
Wet Pasture	145
Bottomland Hardwood Wet	96
Bottomland Hardwood Dry	47
Marsh - Brackish	16
Marsh - Fresh	10
Marsh - Intermediate	0
Open Water	5
Swamp	25
Total	344

Table 1. Estimated wetland impacts (by cover type) associated with the construction of the New Orleans to Venice Non-Federal Levee in Plaquemines Parish, Louisiana.

Impacts to wetlands will be mitigated utilizing two methods. Impacts to bottomland hardwood (wet and dry), wet pasture, and swamp habitats will be mitigated by planting bottomland hardwood seedlings in frequently flooded agricultural land using site-suited native tree species. Impacts to marsh habitats (fresh, intermediate, and brackish) will be mitigated utilizing local certified mitigation banks or with a marsh restoration project in coordination with state and federal conservation agencies.

To compensate for the unavoidable wetland impacts that will be caused by the proposed levee improvement project, restoration activities will be required on approximately 351 acres. Approximately 293 acres of bottomland hardwood restoration will be required to compensate for "non-marsh" impacts while approximately 58 acres of marsh restoration will be required to compensate for marsh related impacts. The acquisition and restoration of mitigation property is expected to occur concurrently with the construction activities associated with the proposed project. If additional, unexpected wetland impacts are incurred prior to the completion of the proposed construction activities, further coordination with the United States Fish and Wildlife Service and National Marine Fisheries Service will be required.

GUIDELINES APPLICABLE TO ALL USERS

Guideline 1.1 The guidelines must be read in their entirety. Any proposed use may be subject to the requirements of more than one guideline or section of guidelines and all applicable guidelines must be complied with.

Guideline 1.2 Conformance with applicable water and air quality laws, standards and regulations, and with those other laws, standards and regulations which have been incorporated into the coastal resources program shall be deemed in conformance with the program except to the extent that these guidelines would impose additional requirements.

Guideline 1.3 The guidelines include both general provisions applicable to all uses and specific provisions applicable to certain types of uses. The general guidelines apply in all situations. The specific guidelines apply only to the situations they address. Specific and general guidelines should be interpreted to be consistent with each other. In the event there is an inconsistency, the specific should prevail.

Guideline 1.4 These guidelines are not intended to nor shall they be interpreted so as to result in an involuntary acquisition or taking of property.

Guideline 1.5 No use or activity shall be carried out or conducted in such a manner as to constitute a violation of the terms of a grant or donation of any lands or waterbottoms to the State or any subdivision thereof. Revocations of such grants and donations shall be avoided.

Guideline 1.6 Information regarding the following general factors shall be utilized by the permitting authority in evaluating whether the proposed use is in compliance with the guidelines.

a) type, nature and location of use
b) elevation, soil and water conditions and flood and storm hazard characteristics of site
c) techniques and materials used in construction, operation and maintenance of use
d) existing drainage patterns and water regimes of surrounding area including flow, circulation, quality, quantity and salinity; and impacts on them
e) availability of feasible alternative sites or methods for implementing the use
f) designation of the area for certain uses as part of a local program
g) economic need for use and extent of impacts of use on economy of locality
h) extent of resulting public and private benefits
i) extent of coastal water dependency of the use
j) existence of necessary infrastructure to support the use and public costs resulting from use
k) extent of impacts on existing and traditional uses of the area and on future uses for which the area is suited
l) proximity to and extent of impacts on important natural features such as beaches, barrier islands, tidal passes, wildlife and aquatic habitats, and forests
m) the extent to which regional, state and national interests are served including the national interest in resources and the siting of facilities in the coastal zones as indentified in the coastal resources program
n) proximity to, and extent of impacts on, special areas, particular areas, or other areas of particular concern of the state program or local programs

o) likelihood of, and extent of impacts of, resulting secondary impacts and cumulative impacts
p) proximity to and extent of impacts on public lands or works, or historic, recreational or cultural resources
q) extent of impacts on navigation, fishing, public access, and recreational opportunities
r) extent of compatibility with natural and cultural setting
s) extent of long term benefits or adverse impacts

Response to Guideline 1.1 – 1.6 The guidelines have been read in their entirety. The proposed action would be in conformance with all applicable state laws, regulations, and standards. Therefore, the proposed action is consistent with these guidelines.

Guideline 1.7 It is the policy of the coastal resources program to avoid the following adverse impacts. To this end, all uses and activities shall be planned, sited, designed, constructed, operated and maintained to avoid to the maximum extent practicable significant:

a) reductions in the natural supply of sediment and nutrients to the coastal system by alterations of freshwater flow

Response: The proposed storm surge reduction levee would not alter freshwater flow or the function or capacity of the existing sediment supply restoration projects in the study area.

b) adverse economic impacts on the locality of the use and affected governmental bodies

Response: The proposed storm surge reduction levee would protect life and property, and improve the economic viability of the protected area.

c) detrimental discharges of inorganic nutrient compounds into coastal waters

Response: Inorganic nutrients would not be discharged into coastal waters.

d) alterations in the natural concentration of oxygen in coastal waters

Response: The proposed action would not alter the natural concentration of oxygen in coastal waters.

e) destruction or adverse alterations of streams, wetland, tidal passes, inshore waters and waterbottoms, beaches, dunes, barrier islands, and other naturally biologically valuable areas or protective coastal features

Response: The proposed action would convert approximately 344 acres of wetlands to uplands due to levee construction activities. This impact would be compensated by restoring marsh habitat adjacent to existing CWPPRA projects or by utilizing certified mitigation banks in the project area.

f) adverse disruption of existing social patterns

Response: The proposed project would have no adverse impacts on existing social patterns.

g) alterations of natural temperature regime of coastal waters

Response: The proposed project would have no impact on the natural temperature regime of coastal waters.

h) detrimental changes to existing salinity regimes

Response: The proposed project would have no impact on existing salinity regimes.

i) detrimental changes to littoral and sediment transport processes

Response: The proposed project would have no impact on littoral and sediment transport processes.

j) adverse effects of cumulative impacts

Response: The environmental effects of the proposed project would not contribute adverse increments to the cumulative effects of past, present, and reasonably foreseeable actions.

k) detrimental discharges of suspended solids into coastal waters, including turbidity resulting from dredging

Response: The proposed project does involve dredging, therefore, there would be no project-related change in suspended solids or turbidity in coastal waters.

l) reductions or blockage of water flow or natural circulation patterns within or into an estuarine system or a wetland forest

Response: The proposed project would not block the water flow or natural circulation patterns within an estuary or wetland forest.

m) discharges of pathogens or toxic substances into coastal waters

Response: Clean borrow material from agricultural land would be used to construct the levee. The borrow material would not contain pathogens or toxic substances. There would be no discharge of these types of substances into coastal waters.

n) adverse alteration or destruction of archaeological, historical or other cultural resources

Response: There are two cultural resource sites identified in the study area; one Native American burial mound in Section 1 and a plantation site in Section 5. These sites would be avoided during levee construction.

o) fostering of detrimental secondary impacts in undisturbed or biologically highly productive wetland areas

Response: In summation of secondary impacts, the proposed action would not foster detrimental secondary impacts to biologically productive wetland areas, but instead would offer benefits to the socioeconomic environment in form economic growth and reduced stress levels.

p) adverse alteration or destruction of unique or valuable habitats, critical habitat for endangered species, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands

Response: There are no threatened or endangered species or designated critical habitat within the project area. There are three active bald eagle nest sites located west of Section 1. The nests are located a considerable distance away from the levee alignment. Construction of the levee would not impact nesting bald eagles, important wildlife or fishery breeding or nursery areas, designated wildlife management or sanctuary areas, or forestlands.

q) adverse alteration or destruction of public parks, shoreline access points, public works, designated recreation areas, scenic rivers, or other areas of public use and concern

Response: No such areas would be impacted by the proposed action.

r) adverse disruptions of coastal wildlife and fishery migratory patterns

Response: No disruptions of coastal wildlife and fishery migratory patterns would occur.

s) land loss, erosion and subsidence

Response: There would be no land loss and erosion associated with the proposed project. There would be no impact on natural subsidence.

t) increases in the potential for flood, hurricane or other storm damage, or increases in the likelihood that damage will occur from such hazards

Response: The project purpose is to reduce hurricane storm surge.

u) reductions in the long-term biological productivity of the coastal ecosystem

Response: The proposed levee enlargement has been designed to minimize adverse impacts on long-term biological productivity of the coastal ecosystem.

Guideline 1.8 In those guidelines in which the modifier "maximum extent practicable" is used, the proposed use is in compliance with the guideline if the standard modified by the term is complied with. If the modified standard is not complied with, the use will be in compliance with the guideline if the permitting authority finds, after a systematic consideration of all pertinent

information regarding the use, the site and the impacts of the use as set forth in guideline 1.6, and a balancing of their relative significance, that the benefits resulting from the proposed use would clearly outweigh the adverse impacts resulting from non-compliance with the modified standard and there are no feasible and practical alternative locations, methods and practices for the use that are in compliance with the modified standard and :

a) significant public benefits will result from the use, or;
b) the use would serve important regional, state or national interests, including the national interest in resources and the siting of facilities in the coastal zone identified in the coastal resources program, or;
c) the use is coastal water dependent.

The systematic consideration process shall also result in a determination of those conditions necessary for the use to be in compliance with the guideline. Those conditions shall assure that the use is carried out utilizing those locations, methods and practices which maximize conformance to the modified standard; are technically, economically, environmentally, socially and legally feasible and practical; and minimize or offset those adverse impacts listed in guideline 1.7 and in the guideline at issue.

Guideline 1.9 Uses shall be to the maximum extent practicable be designed and carried out to permit multiple concurrent uses which are appropriate for the location and to avoid unnecessary conflicts with other uses of the vicinity.

Guideline 1.10 These guidelines are not intended to be, nor shall they be, interpreted to allow expansion of governmental authority beyond that established by La. R.S. 49:213.1 through 213.21, as amended; nor shall these guidelines be interpreted so as to require permits for specific uses legally commenced or established prior to the effective date of the coastal use permit program nor to normal maintenance or repair of such uses.

Response to Guideline 1.8 – 1.10: The guidelines have been read in their entirety. The proposed action is consistent with these guidelines.

GUIDELINES FOR LEVEES

Guideline 2.1 The leveeing of unmodified or biologically productive wetlands shall be avoided to the maximum extent practicable.

Response: Approximately 344 acres of wetlands would be adversely impacted by the proposed project. The majority of the existing NFL would be incorporated into the new, larger levee. To raise the height of the levee requires expanding the levee base into adjacent wetlands. Wetlands were avoided to the maximum extent practicable. Wetland loses would be mitigated by restoring bottomland hardwood and marsh habitat or by utilizing certified mitigation banks within the project area.

Guideline 2.2 Levees shall be planned and sited to avoid segmentation of wetland areas and systems to the maximum extent practicable.

Response: The proposed levee alignment would not segment wetlands.

Guideline 2.3 Levees constructed for the purpose of developing or otherwise changing the use of a wetland area shall be avoided to the maximum extent practicable.

Response: The existing NFL would be incorporated into the new, larger levee. To raise the height of the levee requires expanding the levee base into adjacent wetlands. Wetlands were avoided to the maximum extent practicable.

Guideline 2.4 Hurricane and flood protection levees shall be located at the non-wetland/wetland interface or landward to the maximum extent practicable.

Response: The majority of existing NFL would be incorporated into the new, larger levee. To raise the height of the levee requires expanding the levee base into adjacent wetlands. Wetlands were avoided to the maximum extent practicable.

Guideline 2.5 Impoundment levees shall only be constructed in wetlands as part of approved water or marsh management projects or to prevent release of pollutants.

Response: The proposed storm surge protection levee is not an impoundment levee.

Guideline 2.6 Hurricane or flood protection levee systems shall be designed, built and thereafter operated and maintained utilizing best practical techniques to minimize disruptions of existing hydrologic patterns, and the interchange of water, beneficial nutrients and aquatic organisms between enclosed wetlands and those outside the levee system.

Response: The NFL has been in existence for many years. This levee altered the hydrologic patterns, interchange of water, nutrients and aquatic organisms between wetlands on the land side and flood side of the levee. The proposed enlargement of the levee would not alter the existing hydrologic conditions, i.e., the wetlands on the land side of the levee would remain isolated from wetlands on the flood side until the levee is overtopped by a hurricane exceeding the Standard Project hurricane (SPH) level event.

GUIDELINES FOR LINEAR FACILITIES

The guidelines have been read in their entirety. The proposed levee project does not involve the construction of a linear facility; therefore, these guidelines are not applicable to the project.

GUIDELINES FOR DREDGED SPOIL DEPOSITION

The guidelines have been read in their entirety. The proposed levee project does not involve the deposition of dredged spoil; therefore, these guidelines are not applicable to the project.

GUIDELINES FOR SHORELINE MODIFICATION

The guidelines have been read in their entirety. The proposed levee project does not involve shoreline modification; therefore, these guidelines are not applicable to the project.

GUIDELINES FOR SURFACE ALTERATIONS

The guidelines have been read in their entirety and noted. The proposed action would not have adverse alternations to surfaces, with specific responses as follows:

Guideline 6.2 Public and private works projects such as levees, drainage improvements, road, airports, ports, and public utilities are necessary to protect and support needed development and shall be encouraged. Such projects shall, to the maximum extent practicable, take place only when:

a) they protect or serve those areas suitable for development pursuant to Guideline 6.1; and
b) they are consistent with other guidelines; and
c) they are consistent with all relevant adopted state, local and regional plans.

Response: The proposed storm surge levee project is consistent with this guideline. The levee would protect life, property, and the evacuation route up to the Standard Project Hurricane (SPH) level event. The proposed levee is consistent with existing state, local, and regional plans (CWPPRA, State Master Plan, LCA, and LACPR).

Guideline 6.4 To the maximum extent practicable wetland areas shall not be drained or filled. Any approved drain or fill project shall be designed and constructed using best practical techniques to minimize present and future property damage and adverse environmental impacts.

Response: Approximately 344 acres of wetlands would be adversely impacted by the proposed project. The majority of the existing NFL would be incorporated into the new, larger levee. To raise the height of the levee requires expanding the levee base into adjacent wetlands. Wetlands were avoided to the maximum extent practicable. Wetland loses would be mitigated by restoring bottomland hardwood species or marsh habitat or by utilizing certified mitigation banks in the project area.

Guideline 6.6 Areas modified by surface alteration activities shall, to the maximum extent practicable, be revegetated, refilled, cleaned and restored to their predevelopment condition upon termination of the use.

Response: The earthen levee would be seeded with sod-forming grasses native to the project area. The levee would be incorporated in the federal levee system and maintained for the project life.

Guideline 6.7 Site clearing shall to the maximum extent practicable be limited to those areas immediately required for physical development.

Response: The base of the levee would be expanded in order to raise the height of the levee. Site clearing would be kept to the minimum to allow construction of the levee.

Guideline 6.8 Surface alterations shall, to the maximum extent practicable, be located away from critical wildlife areas and vegetation areas. Alterations in wildlife preserves and management areas shall be conducted in strict accord with the requirements of the wildlife management body.

Response: There are no critical wildlife or vegetation areas, wildlife preserves or management areas located in the project vicinity.

Guideline 6.13 Surface alteration sites and facilities shall be designed, constructed, and operated using the best practical techniques to prevent the release of pollutants or toxic substances into the environment and minimize other adverse impacts.

Response: Clean borrow material from agricultural land would be used to construct the levee. The borrow material would not contain pathogens or toxic substances. There would be no discharge of these types of substances into the environment.

Guideline 6.14 To the maximum extent practicable only material that is free of contaminates and compatible with the environmental setting shall be used as fill.

Response: Clean borrow material from agricultural land would be used to construct the levee. The borrow material would be free of contaminants. There would be no discharge of these types of substances into the environment.

GUIDELINES FOR HYDROLOGIC AND SEDIMENT TRANSPORT MODIFICATIONS

The guidelines have been read in their entirety and noted. The proposed levee would comply with all guidelines for hydrologic and sediment transport modifications with specific responses as follows:

Guideline 7.1 The controlled diversion of sediment-laden waters to initiate new cycles of marsh building and sediment nourishment shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants in the freshwater source.

Guideline 7.2 Sediment deposition systems may be used to offset land loss, to create or restore wetland areas or enhance building characteristics of a development site. Such systems shall only be utilized as part of an approved plan. Sediment from these systems shall only be discharged in the area that the proposed use is to be accomplished.

Guideline 7.4 The diversion of freshwater through siphons and controlled conduits and channels, and overland flow to offset saltwater intrusion and to introduce nutrients onto wetland shall be encouraged and utilized whenever such diversion will enhance the viability and productivity of the outfall area. Such diversions shall incorporate a plan for monitoring and reduction and/or amelioration of the effects of pollutants in the freshwater source.

Response to Guideline 7.1, 7.2 and 7.4 The proposed levee enlargement would not alter the function or capacity of the existing sediment diversion projects in the project area.

GUIDELINES FOR DISPOSAL OF WASTES

The guidelines have been read in their entirety. The proposed levee project does not involve the disposal of waste; therefore, these guidelines are not applicable to the project.

GUIDELINES FOR USES THAT RESULT IN THE ALTERATION OF WATERS DRAINING INTO COASTAL WATERS

The guidelines have been read in their entirety and are not applicable to the proposed levee project.

GUIDELINES FOR OIL, GAS, AND OTHER MINERAL ACTIVITIES

The guidelines have been read in their entirety and the proposed levee project would not involve oil, gas, and other mineral activities; therefore, these guidelines are not applicable to the project.

BOBBY JINDAL
GOVERNOR

SCOTT A. ANGELLE
SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

January 24, 2011

Gary L. Young
Chief, Vicksburg Planning Branch
Vicksburg District, Corps of Engineers
4155 Clay Street
Vicksburg, MS 39183-3435

RE: **C20100384,** Coastal Zone Consistency
Vicksburg District, Corps of Engineers
Direct Federal Action
New Orleans to Venice Non-Federal Levee System,
Plaquemines Parish, Louisiana

Dear Mr. Young:

The above referenced project has been reviewed for consistency with the Louisiana Coastal Resources Program in accordance with Section 307 (c) of the Coastal Zone Management Act of 1972, as amended. The project, as proposed in this application, is consistent with the LCRP. If you have any questions concerning this determination please contact Brian Marcks of the Consistency Section at (225) 342-7939 or 1-800-267-4019.

Sincerely yours,

Gregory J. DuCote
Administrator
Interagency Affairs/Field Services Division

GJD/JDH/bgm

cc: Daniel Sumerall, Vicksburg COE
David Butler, LDWF
Elizabeth Davoli, OCPR
Albertine Kimble, Plaquemines Parish
Frank Cole, OCM FI

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APPENDIX D
PUBLIC COORDINATION

United States Department of the Interior

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

September 10, 2009

Colonel Michael C. Wehr
District Commander
U.S. Army Corps of Engineers
4155 Clay Street
Vicksburg, Mississippi 39183-3435

SUBJECT: Notice of Intent to Prepare a Supplemental Environmental Impact Statement for the New Orleans to Venice Federal Hurricane Protection Levee System, Plaquemines Parish, Louisiana **(DOI Reference No. ER09/854)**

Dear Colonel Wehr:

The U.S. Fish and Wildlife Service (Service) has received the Department of the Army – Corps of Engineers' (Corps) August 11, 2009, Notice of Intent (NOI) to prepare a Supplemental Environmental Impact Statement (SEIS) for the New Orleans to Venice (NOV) Federal Hurricane Protection Levee System in Plaquemines Parish, Louisiana. The Corps' Vicksburg District, in cooperation with the New Orleans District and the Coastal Protection and Restoration Authority of Louisiana, would develop and evaluate possible alternatives to improve the storm damage reduction capability of the NOV Federal levee system. The Service has reviewed the information provided, and offers the following comments in accordance with the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.), the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d), the Migratory Bird Treaty Act (MBTA) (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

According to our records, there are currently no federally listed threatened or endangered species within the proposed study area as described in the NOI. However, given the time required to plan and develop the proposed project, the Service recommends that the Corps conduct annual re-initiation of ESA consultation. Such annual updates will ensure that any listed species information remains current as project development progresses.

The proposed study area may provide nesting habitat for the bald eagle (*Haliaeetus leucocephalus*), which was officially removed from the List of Endangered and Threatened Species on August 8, 2007. Bald eagles nest in Louisiana from October through mid-May. Bald eagles generally nest in large trees located near coastlines, rivers, or lakes that support adequate

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food supplies. In the southeastern Parishes, eagles typically nest in mature trees (e.g., bald cypress, sycamore, willow, etc.) near fresh to intermediate marshes or open water. Major threats to this species include habitat alteration, human disturbance, and environmental contaminants (i.e., organochlorine pesticides and lead).

Breeding bald eagles defend "territories" that may be reoccupied annually. In addition to the active nest, a territory may include one or more alternate nests that are built and maintained by the eagles, but which are not used for nesting in a given year. Potential nest trees within a territory may, therefore, provide important alternative bald eagle nest sites. Bald eagles are vulnerable to disturbance during courtship, nest building, egg laying, incubation, and brooding. Disturbance during these periods 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.

Although the bald eagle has been removed from the List of Endangered and Threatened Species, bald eagles and their nests continue to be protected under the MBTA and the BGEPA. The Service developed the National Bald Eagle Management (NBEM) 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 BGEPA. A copy of the NBEM Guidelines is available at: http://www.fws.gov/southeast/es/baldeagle/NationalBaldEagleManagementGuidelines.pdf. 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. On-site personnel should be informed of the possible presence of nesting bald eagles within the project boundary, and should identify, avoid, and immediately report any such nests to this office. If a bald eagle nest occurs or is discovered within or adjacent to the proposed project area, then an evaluation must be performed to determine whether the project is likely to disturb nesting bald eagles. That evaluation may be conducted on-line at: http://www.fws.gov/southeast/es/baldeagle. Following completion of the evaluation, that website will provide a determination of whether additional consultation is necessary. A copy of that determination should be provided to this office. The Division of Migratory Birds for the Southeast Region of the Service (phone: 404/679-7051, e-mail: SEmigratorybirds@fws.gov) has the lead role in conducting such consultations. Should you need further assistance interpreting the guidelines or performing an on-line project evaluation, please contact this office.

The proposed study area is known to support colonial nesting waterbirds. Colonies may be present that are not currently listed in the database maintained by the Louisiana Department of Wildlife and Fisheries (LDWF). That database is updated primarily by monitoring the colony sites that were previously surveyed during the 1980s. Until a new, comprehensive coast-wide survey is conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season. To minimize disturbance to colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary

within this window depending on species present). In addition, we recommend that on-site contract personnel be informed of the need to identify colonial nesting birds and their nests, and should avoid disturbing them during the breeding season.

The Service strongly recommends investigation of alternatives which avoid and minimize impacts to wetlands. In instances where existing levee footprints are to be enlarged, the study should investigate design alternatives which increase levee footprints toward the protected side to avoid impacts to wetlands outside of the protected system. In addition, the enclosure of large wetland tracts should be avoided to the greatest degree practicable.

Additionally, the Corps should ensure that any proposed alignments are compatible with the coastal restoration strategies identified in the 1993 Louisiana Coastal Wetlands Restoration Plan, the Coast 2050 Plan (both of which were developed in accordance with the Coastal Wetlands Planning, Protection and Restoration Act [CWPPRA]), Louisiana's Comprehensive Master Plan for a Sustainable Coast (State Master Plan), as well as the keystone strategies developed for the Louisiana Coastal Area Comprehensive Coastwide Feasibility Study (LCA) and the Louisiana Coastal Protection and Restoration Project (LACPR). Specifically, the West Pointe a la Hache Outfall Management Project, funded under CWPPRA, proposes to optimize the operation of the West Pointe a la Hache Siphons to divert water and sediment from the Mississippi River into portions of the study area. Section 303(d) of the CWPPRA requires the Secretary of the Army, in consultation with the Director of the Service and the Administrator of the Environmental Protection Agency (EPA), to ensure that Corps projects are consistent with the purposes of restoration plans prepared in compliance with Section 303(b) of CWPPRA. We recommend that the Corps fully assess the consistency of any proposed alignments with the restoration measures that have been previously identified under CWPPRA, LCA, State Master Plan, and LACPR.

The President's Council on Environmental Quality defined the term "mitigation" in the National Environmental Policy Act regulations to include: (a) avoiding the impact altogether by not taking a certain action or parts of an action; (b) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (c) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (e) compensating for the impact by replacing or providing substitute resources or environments. The Service's Mitigation Policy (Federal Register, Volume 46, No. 15, January 23, 1981) supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. That policy identifies four resource categories that are used to insure that the level of mitigation recommended by Service biologists will be consistent with the fish and wildlife resource values involved. Considering the high value for fish and wildlife and the relative scarcity of forested wetlands and coastal marsh, those wetlands have been designated Resource Category 2 habitats. The mitigation goal for habitats in this resource category is no net loss of in-kind habitat value. Detailed mitigation plans should be developed during the feasibility stage.

The Service is assisting the Corps in assessing impacts of, and mitigation requirements for, borrow sites which are needed to complete authorized improvements, and to construct Federal and non-Federal hurricane/flood protection levees in southern Louisiana. Borrow areas should

be located within the protected side of the system and preferably within existing agricultural lands and non-wet pasture areas. Accordingly, the Service recommends that the enclosed protocol be adopted and utilized to identify borrow sources.

We look forward to assisting the Corps in the documentation of existing conditions, development of alternatives, and assessment of effects of project alternatives on Service trust resources during the subsequent feasibility study. Should you have any questions regarding our comments, please contact Ms. Brigette Firmin (337/291-3108) of this office.

Sincerely,

James F. Boggs
Supervisor
Louisiana Field Office

Enclosure

cc: DOI, OEPC, Washington, D.C. (Attn: Ms. Loretta Sutton)
DOI, OEPC, Albuquerque, NM (Attn: Mr. Steven Spencer)
FWS, BCPA (ERT), Arlington, VA (Attn: Ms. Stephanie Nash)
FWS, Atlanta, GA (Attn: Mr. Jerry Ziewitz)
COE, Planning, Programs, and Project Management Division, New Orleans, LA (Attn: Ms. Elizabeth Behrens, PM-RS)
EPA, Dallas, TX
NMFS, Baton Rouge, LA
LDWF, Baton Rouge, LA (Attn: Mr. Kyle Balkum)
LDWF, Natural Heritage Program, Baton Rouge, LA
CPRA, Baton Rouge, LA (Attn: Mr. Garret Graves)
OCPR, Baton Rouge, LA

ENCLOSURE

BORROW SOURCE PROTOCOL

United States Department of the Interior

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

August 7, 2006

Colonel Richard P. Wagenaar
District Commander
U.S. Army Corps of Engineers
Post Office Box 60267
New Orleans, Louisiana 70160-0267

Dear Colonel Wagenaar:

As you know, the U.S. Fish and Wildlife Service (Service) is assisting the U.S. Army Corps of Engineers (Corps) in assessing impacts of, and mitigation requirements for, borrow sites which are needed to complete authorized improvements, and to construct Federal and non-Federal hurricane/flood protection levees in southern Louisiana. Those improvements to hurricane and flood control projects are authorized by the Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico (Public Laws 109-148, PL 84-99 and PL 109 234 (4th supplemental)). This letter is provided in accordance with the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended: 16 U.S.C. 661 et seq.), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 et seq.), but it does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the Fish and Wildlife Coordination Act.

Through the efforts of Task Force Guardian, the Corps has restored Hurricane Katrina-damaged hurricane/flood protection projects to their authorized or previously permitted/constructed protection levels. Identification of borrow areas needed to complete those repairs utilized a protocol that prioritized selection of those sites in the following order: existing commercial pits, upland sources, previously disturbed/manipulated wetlands within a levee system, and low-quality wetlands outside a levee system. The Service supports the use of such protocols to avoid and minimize impacts to wetlands and bottomland hardwoods within project areas. Avoidance and minimization of those impacts helps to provide consistency with restoration strategies and compliments the authorized hurricane protection efforts. Such consistency is also required by Section 303(d)(1) of the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA).

Accordingly, the Service recommends that prior to utilizing borrow sites every effort should be made to reduce impacts by using sheetpile and/or floodwalls to increase levee heights wherever feasible. In addition, the Service recommends that the following protocol be adopted and utilized to identify borrow sources in descending order of priority:

1. Permitted commercial sources, authorized borrow sources for which environmental clearance and mitigation have been completed, or non-functional levees after newly constructed adjacent levees are providing equal protection.

2. Areas under forced drainage that are protected from flooding by levees, and that are:

   a) non-forested (e.g., pastures, fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

3. Sites that are outside a forced drainage system and levees, and that are:

   a) non-forested (e.g., pastures fallow fields, abandoned orchards, former urban areas) and non-wetlands;

   b) wetland forests dominated by exotic tree species (i.e., Chinese tallow-trees) or non-forested wetlands(e.g., wet pastures), excluding marshes;

   c) disturbed wetlands (e.g., hydrologically altered, artificially impounded).

Notwithstanding this protocol, the location, size and configuration of borrow sites within the landscape is also critically important. Coastal ridges, natural levee flanks and other geographic features that provide forested/wetland habitats and/or potential barriers to hurricane surges should not be utilized as borrow sources, especially where such uses would diminish the natural functions and values of those landscape features.

To assist in expediting the identification of borrow sites, the Service recommends that immediately after the initial identification of a new borrow site the Corps should initiate informal consultation with the Service regarding potential impacts to federally listed threatened or endangered species. To aid you in complying with those proactive consultation responsibilities, the Service has enclosed a list of threatened and endangered species and their critical habitats within the coastal parishes of the New Orleans District.

The Service offers the following additional recommendations for reducing borrow site impacts on fish and wildlife resources and, where feasible, enhancing those resources. However, these additional recommendations should not be implemented if they would result in the expansion of existing borrow pits or construction of new borrow pits in wetlands or bottomland hardwoods.

1. A minimum of 30 percent of the borrow pits' edge should slope no greater than 5 horizontal (H):1 vertical (V), starting from the water line down to a depth of approximately 5 feet.

2. Most of the woody vegetation removed during clearing and grubbing should be placed into the deepest parts of the borrow pits and the remaining debris should be placed in the water along the borrow pit shorelines, excluding those areas where the 5H:1V slope, per recommendation 1, have been constructed.

3. Following construction, perimeter levees (if constructed) around each borrow pit should be gapped at 25-foot intervals with an 8-foot-wide breach, the bottom elevation of which should be level with the adjacent natural ground elevation.

When avoidance and minimization of bottomland hardwood and wetland impacts is not practicable, all unavoidable net losses of those habitats should be fully offset via compensatory mitigation. Such compensatory mitigation should sited within the watershed and/or hydrologic unit where the impact occurred, and should be completed concurrently with borrow operations, or as soon thereafter as possible.

The combined need for borrow necessary to complete authorized improvements to and construction of Federal and non-Federal hurricane/flood protection levees, and the potential construction of levees capable of withstanding a category 5 hurricane, will require substantial amounts of borrow. It is highly likely such amounts would exceed local availability. In the case of ongoing hurricane/flood protection projects (e.g., Morganza to the Gulf) the search for levee-building material has been conducted primarily on project-by-project basis. In the context of such project-by-project searches for borrow material, the least-expensive and easiest sources of borrow material are usually located within wetlands and/or bottomland hardwoods, adjacent to the proposed levee. Such on-site sources, however, often involve adverse impacts to wetlands, thus exacerbating the overall wetland loss problem in all coastal basins, especially those in the deltaic plain of southeast Louisiana. In short, while such on-site sources are relatively inexpensive, they will frequently be inconsistent with coastal restoration efforts and, to the extent that wetlands will be adversely impacted, use of those sites will be counterproductive with respect to minimizing wetland impacts and attaining the goal of increasing non-structural hurricane protection within a sustainable ecosystem.

Large-scale, off-site borrow sources could have the potential to reduce environmental impacts from levees and expedite project-by-project environmental review. Such potential "programmatic" borrow sources could include uplands along the Mississippi River, beneficial use of sediments dredged for navigation purposes (including the mining of disposal sites), the Mississippi River, and offshore deposits (e.g., Ship Shoal). As part of the planning process, we recommend that the Corps begin investigating the practicability of various large-scale, off-site borrow sources and actively involve all resource agencies with the Protection and Restoration Office's Borrow Team efforts.

Programmatic planning would be essential to identify borrow sites of acceptable quantity and quality, while avoiding and/or minimizing adverse environmental impacts. We therefore recommend that a plan be developed that integrates borrow resources, uses, and needs for various programs and activities. Guiding principles should be developed to identify borrow resources, borrow-site designs, and prioritize uses to avoid competing for resources, maximize benefits with those resources, and avoid adverse environmental impacts.

We appreciate the opportunity to provide this planning-aid letter and would be pleased to assist your agency in further identification of potential borrow sources. Should you or your staff have any questions regarding this letter, please contact David Walther (337/291-3122) of this office.

Sincerely,

Russell C. Watson
Supervisor
Louisiana Field Office

Enclosure

cc: National Marine Fisheries Service, Baton Rouge, LA
EPA, Dallas, TX
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources, CMD, Baton Rouge, LA
LA Dept. of Natural Resources, CRD, Baton Rouge, LA

United States Department of the Interior

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

March 20, 2007

Mr. Alan W. Bennett
U.S. Army Corps of Engineers
PM-RS
P.O. Box 60267
New Orleans, Louisiana 70160-0267

Dear Mr. Bennett:

The U.S. Fish and Wildlife Service (Service) has reviewed the February 16, 2007, Notice of Intent (NOI) for the U.S. Army Corps of Engineers (Corps) to prepare a Supplemental Environmental Impact Statement (SEIS) and the Scoping Meeting Announcement for the New Orleans to Venice, LA, Hurricane Protection Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana. The purpose of that project is to modify certain non-Federal levees in Plaquemines Parish to provide improved storm surge protection and to protect evacuation routes. The study area would encompass forested wetlands, wet pasture, marsh and open water habitats on the west side of the Mississippi River between Oakville, Louisiana and St. Jude, Louisiana. The Service submits the following comments in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act of 1969, as amended, and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 661 et seq.).

The NOI lists all significant fish and wildlife resources that should be addressed in the SEIS including threatened and endangered species, and important habitats such as marshes, swamps, and open water. The Service recommends that all alternatives being investigated include measures to reduce adverse impacts to wetlands which may result from the creation of borrow sites and levee modifications.

The proposed project may impact federal trust resources such as nesting wading birds and threatened and endangered species within the proposed project area. Your office will be responsible for a determination of project impacts to each of those species; any designated critical habitat, and the supporting rationale for that determination. Your determination should be provided to the Service for review and/or concurrence within the forthcoming study. It is recommended that you initiate consultation with our office as soon as possible by requesting a list of threatened and endangered species that may be impacted by the proposed project. Your request should include a map of the project area, project features, and a project description. Please send your request to our office.

The study should investigate alternatives which avoid and minimize impacts to wetlands. In instances where existing levee footprints are to be enlarged, the study should investigate design

alternatives which increase levee footprints toward the protected side to avoid impacts to wetlands outside of the protected system. In addition, the use of steel sheetpiling to increase levee height should be investigated as an alternative to increasing levee footprints. New levee alignments should be located to the maximum extent practicable on the development/non-development interface. Locating new levees at this interface may also have the added benefit of utilizing existing wetlands/undeveloped lands as a protective buffer. Where appropriate, existing levees located outside of new levee alignments should be appropriately gapped to facilitate restoration of habitat and other functional values in hydrologically degraded or former wetlands. In addition, the enclosure of large wetland tracts should be avoided to the greatest degree practicable. The Corps should consider construction of marsh or forested berms as an alternative to traditional armoring to provide protection of the levee during storm events. Construction of marsh or forested berms might also help to compensate for any unavoidable project-related losses of marsh or coastal bottomland hardwood forests. Borrow areas should be located within the protected side of the system and preferably within existing agricultural lands and non-wet pasture areas. Borrow outside of the existing alignment should be avoided.

Additionally, the Corps should ensure that any proposed alignments are compatible with the long-term management and restoration strategies identified in the 1993 Louisiana Coastal Wetlands Restoration Plan and the Coast 2050 Plan (both of which were developed in accordance with the Coastal Wetlands Planning, Protection and Restoration Act [CWPPRA]), as well as the keystone strategies developed for the Louisiana Coastal Area Comprehensive Coastwide Feasibility Study (LCA) and the Louisiana Coastal Protection and Restoration Project (LACPR). Specifically, the Delta Building Diversion at Myrtle Grove, funded under the CWPPRA, proposes to divert water and sediment from the Mississippi River through the study area and into wetlands west of the proposed levee alignment. Section 303(d) of the CWPPRA requires the Secretary of the Army, in consultation with the Director of the Service and the Administrator of the Environmental Protection Agency (EPA), to ensure that Corps projects are consistent with the purposes of restoration plans prepared in compliance with Section 303(b) of CWPPRA. A diversion near Myrtle Grove, Louisiana is also a key component of plans being considered under the LCA Study and LACPR Project. We, therefore, recommend that the SEIS fully assess the consistency of any proposed alignments with the restoration measures that have been previously identified under CWPPRA, LCA, and LACPR.

The Corps and the Service have formally committed to work together to conserve, protect, and restore fish and wildlife resources while ensuring environmental sustainability of our Nation's water resources under the January 22, 2003, Partnership Agreement for Water Resources and Fish and Wildlife. Accordingly, the Service would be pleased to serve as a cooperating agency in developing the SEIS for the proposed project in accordance with applicable NEPA/Council on Environmental Quality guidance. Our participation will be specifically limited to: 1) participating in meetings and field trips to obtain baseline information on project-area fish and wildlife resources; 2) evaluating the proposed project's impacts to wetlands and associated fish and wildlife resources, and assisting in the development of measures to avoid, minimize, and/or compensate for those impacts; and 3) providing technical assistance in describing the impacts of the proposed activity to Federally listed threatened or endangered species and/or their critical habitat and in determining whether the proposed project is "likely (or not likely) to adversely affect" each of those species and/or their critical habitat.

We look forward to working closely with the Corps during preparation of the SEIS. If you have any questions regarding our comments, please contact Kevin Roy at 337/291-3120.

Sincerely,

Jim F. Boggs
Acting Field Supervisor
Louisiana Field Office

cc: Dept. of the Interior, Office of Env. Policy and Compliance, Washington, D.C.
FWS, Branch of Advanced Planning and Habitat Conservation, Arlington, VA
FWS, Atlanta, GA
Environmental Protection Agency, Dallas, TX
National Marine Fisheries Service, Baton Rouge, LA
LA Dept. of Wildlife and Fisheries, Baton Rouge, LA
LA Dept. of Natural Resources (CRD), Baton Rouge, LA

LOUISIANA DEPARTMENT OF AGRICULTURE & FORESTRY
MIKE STRAIN DVM
COMMISSIONER

August 27, 2009

Colonel Robert Sinkler
Commander, Hurricane Protection Office
U. S. Army Corps of Engineers
7400 Leake Avenue
New Orleans, LA 70118

Dear Colonel Sinkler:

I am writing to express support for the Plaquemines Parish Government's position on the alignment of the federal levee system in their parish.

It would seem logical that the large section of forestland currently shown in Section 4E of the project map as not being included inside the planned levee system, be incorporated into the area being protected by the proposed project. There are very limited forested areas remaining in this region of the state, and consequently, every effort should be made to protect such areas from degradation and provide for their sustainability.

It would appear, therefore, if there are no extenuating circumstances, that this large area of forestland currently shown in Section 4E of the project map should be included in the land area being protected by the proposed levee system.

Thank you in advance for your consideration in this matter.

Very truly yours,

Mike Strain DVM
Commissioner

MS:sw

cc: Mr. Billy Nungesser
Plaquemines Parish President

Post Office Box 631, 5825 Florida Blvd., Baton Rouge, Louisiana 70821-0631 Telephone: (225) 922-1234 Fax: (225) 922-1253 www.ldaf.state.la.us

Scoping Report

for the Supplemental Environmental Impact Statement for the New Orleans to Venice, LA, Hurricane Protection Project: Incorporation of Non-Federal Levees From Oakville to St. Jude, Plaquemines Parish, Louisiana

Final

US Army Corps of Engineers
New Orleans District

Prepared for

US Army Corps of Engineers, New Orleans District

Prepared by

Tetra Tech, Inc.
Baton Rouge, Louisiana

May 2007

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ACRONYMS

CEMVN	Army Corps of Engineers, New Orleans District
CEQ	Council on Environmental Quality
DOPAA	Description of Proposed Action and Alternatives
NEPA	National Environmental Policy Act
NOI	Notice of Intent
SEIS	Supplemental Environmental Impact Statement

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) is initiating a Supplemental Environmental Impact Statement (SEIS) to address the feasibility of incorporating nonfederal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing New Orleans to Venice Hurricane Protection Project. The project name is *New Orleans to Venice, Louisiana, Hurricane Protection Project: Incorporation of Non-Federal Levees From Oakville to St. Jude, Plaquemines Parish, Louisiana, Supplemental Environmental Impact Statement.* This scoping report summarizes the scoping process for the SEIS and includes background on the project, developing and facilitating public scoping meetings, and analyzing public comments for use in defining the scope of the investigation. Two scoping meetings were held in late March in locations that were easily accessible to the broadest cross section of the public from the project area. Comments were received throughout the scoping process in the form of written comments, oral comments, and via a court reporter present at the meetings.

A detailed analysis of all written and oral comments identified seven categories of concern: levee alignment, buffer zone, levee height and maintenance, project material, project cost and duration, wetland and habitat, and other. The use of the existing levee alignment received the most comments throughout the scoping process. Protecting as much land as possible was also a major concern. Buffer zone issues that should be considered in the SEIS include how to manage *ponding* or the *puddle effect*. For instance, including spillways into the levee design to allow water to escape during flood events was suggested. The majority of the comments received regarding levee height and maintenance involved the Myrtle Grove area/canal and whether the height of this levee would be consistent with the adjacent levees (i.e., 12 feet). The source of the project material used to build the levee was a primary concern throughout the scoping process. Comments regarding the vulnerability of the project area to hurricane impacts expressed the need for an expedited process along with concerns about adequate project funding. The public also emphasized the need for the CEMVN to use the best alternative to minimize the impacts to wetlands.

SECTION 1.0 INTRODUCTION

The U.S. Army Corps of Engineers, New Orleans District (CEMVN) is conducting a supplemental environmental impact statement (SEIS) to address the feasibility of incorporating nonfederal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing New Orleans to Venice Hurricane Protection Project. This SEIS is being prepared as a third supplement to the July 1974 Final EIS, New Orleans to Venice, Louisiana, Hurricane Protection Project.

The CEMVN is initiating this study under the authority of Public Law 109-234, Title II, Chapter 3, Flood Control and Coastal Emergencies, which provides an additional amount of funding for *Flood Control and Coastal Emergencies*, as authorized by section 5 of the Flood Control Act of August 18, 1941 (33 United States Code [U.S.C.] 701n), for necessary expenses relating to the consequences of Hurricane Katrina and other hurricanes. Provided that the Secretary of the Army is directed to use the funds appropriated under this heading, the CEMVN will use $215,000,000 to replace or modify certain nonfederal levees in Plaquemines Parish to incorporate the levees into the existing New Orleans to Venice Hurricane Protection Project.

The purpose of this SEIS is to address the feasibility of incorporating nonfederal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing New Orleans to Venice Hurricane Protection Project. The existing federally authorized hurricane protection system does not provide continuous protection from Belle Chasse to Venice. Approximately 34 miles of existing nonfederal levees in Plaquemines Parish do not provide hurricane and storm-damage reduction protection to the federally authorized level of the existing Hurricane Protection Project.

The CEMVN is investigating several levee alignments to protect the communities, businesses, the hurricane evacuation route within Plaquemines Parish, and to avoid wetland impacts. In addition, the CEMVN is considering nonstructural alternatives such as relocating or raising homes and businesses for evaluation and various protection levels for the levee alignments. The CEMVN is also conducting incremental analysis of costs and benefits for different reaches of the levee alignments.

The proposed project study area includes the west bank of the Mississippi River starting near the community of Oakville to the north and ending at St. Jude to the south.

This report contains the details of the public scoping process, including the comments received and the analysis of those comments.

1.1 PURPOSE OF SCOPING

To prepare an SEIS effectively, the scope of the document (i.e., what will be included and evaluated and in what detail) must be determined. Planning of this kind is a required and essential component of preparing an SEIS.[1] The scoping process is to be open to the public and federal,

[1] The SEIS is being prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.), Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of the National Environmental Policy Act (Title 40 of the *Code of Federal Regulations* [CFR] Parts 1500-1508), and CEMVN regulations for implementing NEPA (33 CFR Parts 230 and 325). The SEIS scoping process was developed on the basis of the CEQ guidance for scoping under NEPA.

state, tribal, and local governments and agencies. The objectives of the scoping process are as follows:

- To identify public and federal, state, and local agency concerns.
- To facilitate an efficient SEIS preparation process and ascertain that all required permits and reviews be scheduled concurrently.
- To define the issues and alternatives that will be examined in detail in the SEIS while determining which issues are not relevant to the current investigation.
- To save time in the overall process by helping to ensure that the draft SEIS adequately addresses relevant issues, reducing the possibility that new comments will be identified late in the process causing an SEIS to be rewritten or supplemented. The overall goal of scoping is to produce an adequate and efficient SEIS.

1.2 INITIAL SCOPE OF THE ANALYSIS

In the Notice of Intent (NOI) published February 26, 2007, (see Appendix A), the CEMVN identified the study area and area of influence of this SEIS as the west bank of the Mississippi River, starting near the community of Oakville to the north and ending at St. Jude to the south. The NOI stated that the SEIS would study the authorized goal of replacing or modifying and incorporating certain nonfederal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing New Orleans to Venice Hurricane Protection Project. The goals and objectives for the SEIS as stated by the NOI are to evaluate several levee alignments and nonstructural alternatives such as relocating or raising homes and businesses, to provide hurricane and storm-damage reduction protection to the federally authorized level of the New Orleans to Venice Hurricane Protection Project.

SECTION 2.0
SCOPING PROCESS SUMMARY

The scoping process consisted of seven elements:

- Publish an NOI in the *Federal Register*
- Distribute a public notice/press release to federal, state, tribal, and local officials; local and regional media; and other interested parties in newspapers and on radio and television stations in the region of influence
- Mail a request for public comment to more than 150 interested individuals
- Conduct two public scoping meetings
- Collect public comments (written, oral, e-mail, and fax)
- Review and evaluate comments received
- Develop and distribute a scoping report

Each of these elements is described in more detail in the following subsections.

The CEMVN conducted two public scoping meetings on March 27 and March 28, 2007, to solicit input and help to identify all relevant issues that should be addressed in the SEIS. This input will be used to develop alternative levee alignments and methods of implementing project actions for the SEIS.

2.1 PUBLIC NOTICE

The NOI to prepare an SEIS for the incorporation of certain nonfederal levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, into the existing New Orleans to Venice Hurricane Protection Project was published in the *Federal Register* on February 26, 2007 (Appendix A). It was also distributed to a wide range of news agencies and submitted to the public via mail and e-mail.

The NOI initiated the scoping process and included information pertaining to the project's region of influence, alternative scenarios, and other supplemental information supporting the CEMVN's decision to prepare the draft SEIS. In addition, the NOI identified the CEMVN as the lead federal agency. The NOI also identified that the existing federally authorized hurricane protection system does not provide continuous protection from Belle Chase to Venice and that this condition exposes residents and businesses in several west bank communities and the hurricane evacuation route (Louisiana Highway 23) to a higher potential for flooding in the event of a storm.

The NOI encouraged full public participation to promote open communication on the issues surrounding the proposal. All federal, state, tribal, and local agencies and other persons or organizations were urged to participate in the scoping process. Mr. Alan W. Bennett of the CEMVN, PM-RS, P.O. Box 60267, New Orleans, LA 70160, was listed as the point of contact for further information.

The CEMVN issued a public notice the week of March 19, 2007, announcing the public scoping meetings for the SEIS to be held at Woodland Plantation, Port Sulphur, Louisiana, and Belle

Chase Middle School Gymnasium, Belle Chase, Louisiana. (For a copy of the public notice, see Appendix B.)

2.2 PUBLIC SCOPING MEETING

A request for public comment and announcement of the scoping meetings was sent out to a group of more than 156 interested individuals from the project area on March 9. (For a copy of the request for public comment and the mailing list, see Appendices C and D.) The scoping meetings were held on March 27 and 28, 2007, at Woodland Plantation, Port Sulphur, Louisiana, and Belle Chase Middle School Gymnasium, Belle Chase, Louisiana, respectively. The sites were chosen in an effort to reach the broadest cross section of the public from the project area. Specific locations were chosen on the basis of availability, capacity, and accessibility. The times and locations of the scoping meetings are shown in Table 2-1.

Table 2-1
Public scoping meeting schedule

Date	Time	Location
Tuesday, March 27, 2007	5:30 p.m.–8:30 p.m.	Port Sulphur, Louisiana
Wednesday, March 28, 2007	5:30 p.m.–8:30 p.m.	Belle Chase, Louisiana

The scoping meetings were conducted to seek input from individuals; community organizations; and federal, state, and local agencies on issues and concerns related to the proposed levee alignments and nonstructural alternatives such as relocations or raising homes and businesses.

Meetings were conducted in an open house format, with display booths set up to help participants identify issues and concerns they thought should be addressed in the SEIS. The display booths explained the NEPA process and presented the proposed alternatives. (For a copy of the displays, see Appendix E). A welcome table was set up at the entrance to each meeting where meeting participants were asked to sign an attendance roster (see Appendix F), view the meeting agenda, and take a welcome handout (for these materials, see Appendix F). Members of the CEMVN and the consultant team gave a brief introductory presentation at each meeting followed by an open house during which participants were invited to view the booths and discuss the issues with the technical staff. (For a copy of the scoping meeting presentation, see Appendix H). At the conclusion of this portion of the meeting, the group reconvened for a moderated group discussion that was recorded in its entirety by a court reporter (For transcripts of each discussion, see Appendix I). The technical staff gave a brief summary of the discussions from the open house period. The moderator then asked for any additional comments from the participants regarding the topic being discussed. Following the group discussion, the consultant team and members of the CEMVN concluded the meetings and reminded participants to submit oral or written comments.

More than 150 people attended the meetings. Some attendees elected not to sign in; therefore, not everyone who attended the meetings is included on the attendance rosters. Attendees were encouraged to submit written comments by April 13, to the CEMVN for inclusion in the scoping report. Appendices J and K contain copies of all written and oral comments received.

SECTION 3.0
SCOPING COMMENTS

The scoping process resulted in the submission of individual comments from approximately 20 members of the public and representatives from organizations. The comments were submitted to the CEMVN by mail, e-mail, comment forms provided at the scoping meeting, and to the court reporter at the scoping meetings. These comments are contained in Appendices J (written comments) and K (oral comments). More issues and comments were identified in the public discussions. This section discusses the process of reviewing, organizing, and analyzing those comments.

3.1 REVIEW AND ORGANIZATION OF SCOPING COMMENTS

Written comments were submitted in two formats: meeting handouts (see Appendix G), which were distributed by mail and at the scoping meetings, and letters or e-mails with general comments. (For copies of all written comments submitted to the CEMVN as of April 13, 2007, see Appendix J.) The comment forms returned to the CEMVN contained responses to numerous issues. Each comment was entered into a database and carefully reviewed. After the initial review of the comments, the written and oral comments and the public discussions were evaluated to determine issues of concern. The issues were then separated into seven categories: levee alignment, buffer zone, levee height and maintenance, project material, project cost and duration, wetlands and habitat, and other. As a result of the written and oral comments and the public discussion, 146 issues of concern were identified. (For the complete list of these issues, see Appendix L). If the same issue of concern was raised by five or more individuals, the issue was categorized as a significant issue. As a result, 10 significant issues of concern were identified.

Several issues were identified that are not recommended for analyisis in the SEIS. These issues fall into one of three categories. They (1) can be addressed in the cumulative effects section of this SEIS or in other NEPA documents; (2) are activities that extend beyond the operational and maintenance activities the CEMVN is required to perform by law; or (3) are beyond the scope of work or geographic boundaries for this project. Below is a list of those issues identified in the scoping process that will not be analyzed in this SEIS:

- **Wetland Restoration features.** Several wetland restoration issues, including constructing barrier islands, constructing and implementing spillways, capturing sand in old canals and from the Mississippi River for restoration efforts, or other wetland restoration improvements are outside the project boundary and scope.
- **Backfilling existing pits.** The issue of existing borrow pits in Plaquemines Parish that need to be filled does not pertain to this project.
- **Implementing more transportation alternatives.** Constructing a railroad and a larger (four-lane) highway falls outside the scope of this project.

3.2 COMMENTS AND ISSUES OF CONCERN

Following the initial analysis of the responses gathered from the surveys, a detailed analysis of all written and oral comments was conducted (see Appendix L). All specific issues were identified and put into one of seven categories. A total of 146 issues of concern within the categories were identified and evaluated for inclusion in the SEIS.

Table 3-1 lists the seven categories and number of issues that were identified in each category.

Table 3-1
Number of issues in each category

Category	Number of issues
Levee alignment	42
Buffer zone	9
Levee height and maintenance	16
Project material	9
Project cost and duration	25
Wetland and habitat	36
Other	9
Total	**146**

Of the 146 issues of concern, the 10 significant issues are described under their respective category below.

Levee Alignment

1. **Use the existing levee alignment.** Various reasons for supporting this alternative were described in the comments. Each of these reasons was assigned to one of the categories with the majority falling into the levee alignment category, shown in Table 3-1.
2. **Put the levees farther away from the population and Highway 23 protecting as much land as possible.** According to the comments, putting the levee as far 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.

Buffer Zone

3. **Building levees next to the road would reduce the area for ponding if the levees were overtopped.** If the levee is built next to the highway and is breached, it would reduce the amount of land necessary for ponding, therefore increasing the bowl effect. Meaning, if a breach occurred, building next to the highway would cause the water to fill in between the two levees and would leave no room for the water to disperse.
4. **Building spillways will help the puddle effect.** If there is a breach and spillways are installed, the option of opening the spillways would allow the water to escape faster.
5. **Would like a buffer zone between the levee and Highway 23.** Maintaining a buffer zone between Highway 23 and the levee to protect all the remaining land, and allow the water more room to disperse if the levees were overtopped.

Levee Height and Maintenance

6. **Will the Myrtle Grove canal levee be built to the correct height?** According to the public, the height of the levee at Myrtle Grove is 4 to 5 feet below the adjacent levees.
7. **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

8. **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 CEMVN was going to haul the material in, use material from Plaquemines Parish, or dredge adjacent areas for material.

Project Cost and Duration

9. **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.

Wetlands and Habitat

10. **Use the best alternative to minimize the impact to wetlands.** Many comments stated that the CEMVN should use the best alternative to minimize the impact to wetlands inside the levee along with the adjacent wetlands outside the levee.

SECTION 4.0
CONCLUSIONS

The CEMVN has completed its formal scoping process for the SEIS for the *New Orleans to Venice, LA, Hurricane Protection Project: Incorporation of Non-Federal Levees from Oakville to St. Jude, Plaquemines Parish, Louisiana.* Recognizing that scoping is an iterative process, the CEMVN will continue to give due consideration to all relevant input received throughout the development of the SEIS. Coordination with regulatory agencies and the public will continue. Following the publication of this scoping report, the draft SEIS is planned for publication and public review in May 2008.

A total of 146 issues of concern were identified from the public comments submitted to the CEMVN by mail, e-mail, comment forms provided at the scoping meeting, and to the court reporter as oral comments or through the public discussion at the scoping meetings. Each comment was carefully reviewed and synthesized into seven categories of issues, as previously described in Section 3.1.

As a result of the focus group and public scoping meetings, issues relevant to the SEIS were verified and clearly defined. The overwhelming majority of the comments received indicated that levee alignment, wetland and habitat, and project cost and duration are the three most important categories of issues to be included in this investigation. These three categories represent 70 percent of all written and oral comments submitted. These issues should be the primary focus of the SEIS. The other issues addressed in this document should also be examined. A draft Description of the Proposed Action and Alternatives (DOPAA) that more clearly states the CEMVN's intended action, the purpose of and need for that action, and alternatives to implement the action will be developed on the basis of the issues verified during the scoping process. The DOPAA will be included in the SEIS.

APPENDIX E
WETLAND VALUE ASSESSMENT

US Army Corps of Engineers

Wetland Value Assessment for Non-Federal Levee Hurricane Protection System Plaquemines Parish, Louisiana

November 2010

U.S. Army Corps of Engineers
Vicksburg District

DRAFT

WETLAND VALUE ASSESSMENT
FOR NON-FEDERAL LEVEE HURRICANE PROTECTION SYSTEM
PLAQUEMINES PARISH, LOUISIANA

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1.0 INTRODUCTION

The Plaquemines Parish government currently maintains a non-Federal Hurricane Protection Levee System (NFL) on the west bank of the Mississippi River between river miles 47.0 and 70.5. The U.S. Army Corps of Engineers (USACE) plans to make several improvements to 32 miles of the NFL, as well as construct an additional 2 miles of earthen levees between Point Celeste and St. Jude, Louisiana. This project will combine the NFL system into the existing Federal Hurricane Storm Damage and Risk Reduction System (HSDRRS) in Plaquemines Parish. For purposes of this project, USACE partitioned the levee system into five sections; Section 1 is at the northern end and Section 5 is toward the southern end of the project area (Table 1). Two project alternatives, as well as the No Action Alternative, are being analyzed: Alternative 1: No Action, wherein no improvements to the Plaquemines Parish NFL System would be made; Alternative 2: Proposed Action, wherein a levee footprint providing a 2 percent level of risk reduction would be constructed; and Alternative 3: Locally Preferred Plan (LPP), wherein a combination of a 1 percent level of risk reduction in Section 1 and 2 percent level of risk reduction in Sections 2 through 5 would be constructed.

Table 1. Locations of NFL Levee Sections in Plaquemines Parish, LA

NFL Levee Section	Location
Section 1	Oakville to La Reussite
Section 2	La Reussite to Myrtle Grove
Section 3	Myrtle Grove to Citrus Lands
Section 4	Citrus Lands to Point Celeste
Section 5	Point Celeste to St. Jude

2.0 WETLAND VALUE ASSESSMENT (WVA) METHODOLOGY

Impacts to habitats from construction of the Plaquemines Parish NFL System were analyzed using Wetland Value Assessment (WVA) methodology. The WVA methodology is a quantitative, habitat-based assessment tool developed for use in determining wetland benefits of proposed projects submitted for funding under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA); however, the methodology is widely used to evaluate the impacts of coastal projects on wetland values. The results of the WVA analysis, measured in Average Annual Habitat Units (AAHUs), provide an estimate of the positive or negative environmental effects of a potential project. Typically, for a USACE civil works project, the WVA analysis is applied to the habitats that will be impacted by the project, and if net negative impacts are determined, the WVA is applied to potential mitigation plans to develop appropriate compensatory mitigation.

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

Habitat quality is estimated through the use of community models developed specifically for each habitat type. Each model consists of: 1) a list of variables that are considered important in characterizing fish and wildlife habitat, 2) a Suitability Index (SI) graph for each variable, which defines the assumed relationship between habitat quality and different variable values, and 3) a mathematical formula that

combines the SI for each variable into a single value for habitat quality; that single value is referred to as the Habitat Suitability Index (HSI).

An SI function describes the relationship between a measurable condition and how fish and wildlife habitat quality or 'suitability' of a given habitat type is predicted to change as values of the given variable change. This allows the model user to numerically describe, through the SI, the quality of a habitat for any variable value. Each SI ranges from 0.1 to 1.0, with 1.0 representing the optimal condition for the variable in question. SI graphs are constructed for each variable (Environmental Working Group 2006, Environmental Working Group 2009, Louisiana Department of Natural Resources [LADNR] 1994). The final step in model development is to construct a mathematical formula that combines all SIs into a single HSI value. The HSI values are a numerical representation of the overall or "composite" habitat quality of the particular habitat being evaluated. The HSI formula defines the aggregation of SIs in a manner unique to each habitat type depending on how the formula is constructed (Environmental Working Group 2006).

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

GSRC conducted WVAs to analyze the following habitat types by levee section: swamp, altered/drained bottomland hardwood (BLH) and seasonally tidal BLH forest, subsided ridge, wet pasture, fresh/intermediate marsh, and brackish marsh. The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) coordinated with GSRC throughout the WVA process. Habitat boundaries were identified by field investigations and by a Geographic Information System (GIS) software to analyze light detection and ranging (LIDAR) data; 1998, 2004, 2005, and 2008 digital orthophoto quarter quadrangle (DOQQ) imagery; and the USFWS 1988 National Wetland Inventory habitat classification data.

FWOP and FWP conditions were identified for all habitat types. Variables for FWOP TY 0 and FWP TY 0 were the same. FWP TY 1 is assumed to be complete loss of the original habitat due the construction of the project and the conversion of habitat into levee. Therefore, the lowest or most-suboptimal variables were used for TY 1 through TY 50 for all habitat types.

The footprints of Alternative 2 and Alternative 3 differed in Section 1 of the Plaquemines Parish NFL System; thus, a separate WVA was conducted for each alternative. Sections 2, 3, 4, and 5, however, had the same footprint for both Alternative 2 and Alternative 3, so these WVAs were not analyzed separately. Section 3 was so small that it was combined with Section 4 for analysis. Because of the linear nature of the project area, FWOP variables for swamp, seasonally tidal BLH, hydrologically altered BLH, and wet pasture were averaged across sites. Details and WVA workbooks can be found in Attachment 1.

2.1 SWAMP HABITAT ASSESSMENT

Except for interspersed hummocks along the northern most portion of the project area, the swamp is semi-permanently to permanently flooded and influenced by tidal movement from the Gulf Intracoastal Waterway (GIWW) to the west of the project area, as well as various oil and gas canals southwest and west of the project area. Swamp habitat only occurs in Sections 1 and 2 of the project area adjacent to levee sections; thus, the small portion of Section 2 containing swamp was included with Section 1 for all variable calculations and averages. In order to remain consistent with similar habitat types and other projects in the general vicinity, GSRC used the same assumptions in the swamp and BLH analyses as those used for Individual Environmental Report 13 (IER 13), where applicable (USACE 2009). Data sheets from field visits to Plaquemines Parish are included in Attachment 2.

2.1.1 Variable V_1 – Stand Structure

Each component of stand structure should be viewed independently to determine the percent closure or coverage. The description of each structure class is provided in Table 2.

Table 2. Structure Class Descriptions for V_1 Stand Structure in Swamp Habitat Analysis

	Overstory Closure Percent		Herbaceous Cover Percent		Scrub-Shrub/Midstory Cover Percent
Class 1	33 < 50	and	< 33	and	< 33
Class 2	> 50	and	< 33	and	< 33
Class 3	33 < 50	and	> 33	or	> 33
Class 4	> 50	and	> 33	or	> 33
Class 5	33 < 50	and	> 33	and	> 33
Class 6	> 50	and	> 33	and	> 33

Due to project area size and length, as well as similarity of habitats along the length of the project, values were averaged across all sites for TY 0 (Table 3). Any sites with less than 33 percent canopy closure were considered to have a Class 1 stand structure because they did not contain the characteristics needed to be considered marsh habitat.

Table 3. V_1 Stand Structure (TY 0) Averaged Across all Levee Sections for NFL Swamp Habitat Analysis

Site	Overstory Percent	Midstory Percent	Understory Percent	Class
M Sect1	50	40	95	5
N Sect1	20	10	95	1
O Sect1	20	10	95	1
P Sect1	30	5	100	1
Q Sect1	80	55	80	6
Average	**40**	**24**	**93**	**3**

The value of average stand structure was then predicted over the 50-year project life for FWP and FWOP conditions (Table 4). The area is expected to continue to be semi-permanently or permanently flooded as a result of predicted relative sea level rise (RSLR) and subsidence. Overstory is expected to increase, but canopy closure would not be expected due to semi-permanently and permanently flooded conditions. The midstory is expected to increase slightly, especially on the hummocks along the northern most

portions of the project area, but is expected to decrease as subsidence continues to influence the area. Herbaceous ground cover is expected to stay dense with aquatic vegetation as the current hydrologic conditions are expected to remain unchanged throughout the project life.

Table 4. V_1 Stand Structure Projections for NFL Swamp Habitat Analysis

Condition	TY	Overstory Percent	Midstory Percent	Understory Percent	Class
FWOP	0	40	24	93	3
	1	40	24	93	3
	30	55	40	90	5
	50	60	35	90	5
FWP	0	40	24	93	3
	1	40	24	93	3
	30	0	0	0	1
	50	0	0	0	1

2.1.2 Variable V_2 – Stand Maturity

Stand maturity is based upon the average age or diameter-at-breast-height (DBH) of canopy-dominant and canopy co-dominant trees. Optimal conditions (i.e., SI=1) occur when a canopy is 50 years old or greater (LADNR 1994). Details are provided in attached DBH spreadsheets (Attachment 3) and the Combined Field Site Data Worksheet (Attachment 4). In projecting percentages of cypress *(Taxodium distichum)* and non-cypress species in the canopy, the more dominant species in the understory and midstory were considered, as well as the current water regime. It is expected that non-cypress species would become more dominant over time, as they were slightly more plentiful than cypress in the midstory and understory (Table 5). In-growth of young red maple *(Acer rubrum)* and tupelo *(Nyssa aquatica)* trees would be expected by year TY 30.

Table 5. V_2 Stand Maturity Projections for NFL Swamp Habitat Analysis

Condition	TY	Cypress Trees Percent	Average Cypress DBH (inches)	Non-Cypress Trees Percent	Average Non-Cypress DBH (inches)
FWOP	0	67	19.17	33	10.12
	1	67	19.46	33	10.38
	30	55	22.79	45	13.47
	50	50	28.63	50	19.07
FWP	0	67	19.17	33	10.12
	1	0	0	0	0
	30	0	0	0	0
	50	0	0	0	0

2.1.3 Variable V_3 – Hydrology

Hydrology has four classes that describe the amount of water flow/exchange and flooding duration of the project area. Optimal conditions (i.e., Class 4; SI=1) occur when hydrology is essentially unaltered, and the natural water regime is temporarily, seasonally, or semi-permanently flooded (LADNR 1994). Swamps affected by the project are permanently flooded to semi-permanently flooded, and are located on

the flood-side of NFL. There are several oil and gas canals traversing the area which have slightly altered, but do not significantly change, the natural hydrology of the area. Thus, the FWOP hydrology was evaluated as Class 4 through all TYs, since the natural water regime has not been significantly altered. Hydrology was evaluated as Class 4 for FWP TY 0, but as Class 1 in TY 1 as a result of the project.

2.1.4 Variable V_4 – Size of Contiguous Forested Area

The swamp habitat analysis also takes forest patch size into consideration. Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. Larger forested areas provide higher quality habitat than smaller areas (LADNR 1994). A description of contiguous forest area classes for V_4 can be found in Table 6. The swamp patches analyzed here only occur along Sections 1 and 2 of the NFL.

Table 6. Description of V_4 Size of Contiguous Forest Area for Swamp Habitat Analysis

Class	Description
1	0 to 5 acres
2	5.1 to 20 acres
3	20.1 to 100 acres
4	100.1 to 500 acres
5	> 500 acres

In the project area, there are three forest patches that include swamp: two along Section 1, and one that spans Sections 1 and 2. The sizes of those forest patches are 402.67 acres, 62.33 acres, and 255.93 acres, respectively. The average forest patch size is 240.31 acres. Thus, the averaged size of the contiguous forested area was evaluated as Class 4 throughout all FWOP TYs. FWP TY 0 was evaluated as Class 4, but TY 1 through TY 50 was evaluated as Class 1 as a result of the project.

2.1.5 Variable V_5 – Suitability and Traversability of Surrounding Land Uses

Land use within 0.5 mile of the project area is evaluated to determine its effect on the habitat being analyzed. Wildlife often use habitat adjacent to fresh swamp to forage or nest. Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). Land use information from Section 1 was used for swamp because there was only a small portion of swamp along Section 2 that was not also included in Section 1 (Table 7). Details can be found in the land use calculation spreadsheet in Attachment 5. The existing right-of-way width for the anticipated Proposed Action alignment was used as the baseline for determining the 0.5 mile wide buffer because at the time, no additional information was available. Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that it would change the weight of this variable in the WVA analysis.

Table 7. Land Use within 0.5 mile of the Project Area for NFL Swamp Habitat Analysis

LAND USE	Percent of 0.5 mile wide buffer
BLH, other forested areas, marsh habitat, etc.	48
Abandoned agriculture, overgrown fields, dense cover, etc.	2
Pasture, hayfields, etc.	27
Active agriculture	4
Non-habitat: linear, residential, commercial, industrial development, etc.	19

2.1.6 Variable V_6 – Disturbance

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area. Descriptions of distance classes and type classes associated with V_6 disturbance is found in Table 8. Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to > 500 feet away, but insignificant (LADNR 1994).

Table 8. Description of V_6 Disturbance Distance and Type Classes

Distance Class	Description	Type Class	Description
1	0 to 50 feet away	1	Constant/major disturbance (e.g. highways, industrial)
2	50.1 to 500 feet away	2	Frequent/moderate disturbance (e.g. residential, moderately used waterways and roadways)
3	>500 feet away	3	Seasonal/intermittent disturbance (e.g. agriculture)
		4	Insignificant disturbance (e.g. individual homes, lightly used roads and waterways)

The Mississippi River, GIWW, and Louisiana Highway 23 are all considered Type Class 1 disturbances, but they are all located greater than 500 feet from swamp habitat in the project area. The project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that yielded the most appropriate SI was utilized. Due to the size of the project area and its linear nature, the value was averaged by disturbance areas. Because the only swamp within the project area is located within levee Sections 1 and 2, and because the swamp in Section 2 is only in the northern-most portion of that section and adjacent to Section 1, all disturbance areas were averaged for one value (Table 9). Areas A, B, C, and D are all in Section 1 and Area E is in Section 2. These values were used for all FWOP TYs, as well as FWP TY 0.

Table 9. Determination of V_6 Disturbance for NFL Swamp Habitat Analysis

	Distance Class	Type Class
Area A	2	4
Area B	2	4
Area C	2	2
Area D	2	2
Area E	2	3
AVERAGE	**2**	**3**

The Swamp WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

2.2 SEASONALLY TIDAL BLH HABITAT ASSESSMENT (WET BLH)

The hydrology of BLH habitat outside of the NFL has not been significantly altered. However, due to RSLR and subsidence, it is anticipated that the remaining BLH habitat would eventually convert to swamp as hydrologic conditions become wetter over time. Data were collected from five sites along the flood side of the NFL. Only one site differs in BLH successional stage from the other four sites. Since those BLH stage classes cannot be distinguished on aerial photography and because the BLH forests being analyzed are not evenly aged, data from all five sites were averaged for this analysis. Sections 1, 2, 4, and 5 contained seasonally tidal BLH habitat (Attachment 2).

2.2.1 Variable V_1 – Tree Species Association

Four sites were considered to be at the Class 5 stage because the canopy consists of greater than 50 percent mast or other edible seed producing trees, and hard mast producers constitute more than 20 percent of the canopy (LADNR 1994). One site was considered to be at the Class 2 stage because mast or other edible seed producing trees constitute between 25 percent and 50 percent of the canopy but hard mast producers constitute less than 10 percent of the canopy. Using the Combined Field Site Data Spreadsheet (Attachment 4), those sites were averaged for an overall BLH stage of Class 5.

2.2.2 Variable V_2 – Stand Maturity

Stand maturity is based upon the average age or DBH of canopy-dominant and canopy co-dominant trees. Optimal conditions (i.e., SI=1) occur when the stand is approximately 50 years old or if the average DBH of a stand is greater than 20 inches (LADNR 1994). In this case, average DBH was averaged across all sites because the age of the stand was unknown (Table 10). Details are provided in the DBH spreadsheets (Attachment 3) and Combined Field Site Data Spreadsheet (Attachment 4). Spreadsheets are labeled with each site name and BLH Class.

Table 10. V_2 Stand Maturity Projections for NFL Seasonally Tidal BLH Habitat Analysis

Condition	TY	Avg. DBH (inches)
FWOP	0	10.34
	1	10.60
	20	10.87
	50	19.30
FWP		
	0	10.34
	1	0
	20	0
	50	0

2.2.3 Variable V_3 – Understory/Midstory

The amount of understory and midstory coverage are important because they provide habitat for resting, foraging, and nesting for wildlife (LADNR 1994). Optimal conditions (i.e., SI=1) occur when the understory cover is between 30 and 60 percent, and when the midstory cover is between 20 and 50 percent.

Percentages of understory and midstory were averaged across sites (Table 11). Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4). The understory and midstory varied across sites. Two sites consisted of live oak (*Quercus nigra)* and Chinese tallow *(Triadica sebifera)* overstory, with baccharis (*Baccharis halimifolia)*, wax myrtle (*Myrica cerifera)*, and palmetto *(Sabal sp.)* dominating

the midstory. One site consisted of live oak and a midstory dominated by baccharis. The remaining two sites consisted of a mixture of hard and soft mast species, plus a large amount of Chinese tallow, with a few shrub species. Overall, the understory is expected to decrease over time as seedlings mature and shade out the ground cover or the midstory would become denser as shrubs continue to grow. The midstory is expected to decrease over time as mid-size trees grow into the canopy. As soft mass and non-mast tree species mature, and as subsidence and RSLR continue to slowly affect the project area, the sites would likely become less dominated by hard mast species in TY 20 and TY 50.

Table 11. V_3 Understory/Midstory Projections for Seasonally Tidal BLH Habitat Analysis

Condition	TY	Understory Percent	Midstory Percent
FWOP	0	32	73.8
	1	32	73.8
	20	26	66
	50	20	61
FWP			
	0	32	73.8
	1	0	0
	20	0	0
	50	0	0

2.2.4 Variable V_4 – Hydrology

There are three hydrology classes in BLH WVA analysis (Table 12). The project area is traversed by several oil and gas canals which have slightly altered, but do not significantly change, the natural hydrology of the area. Therefore, hydrology is considered a Class 3 for all FWOP TYs and FWP TY 0.

Table 12. Description of V_4 Hydrology Classes for BLH Habitat Analysis

Hydrology Class	Description
1	Forced drainage system that removes water from surface year-round
2	Level of water table either significantly reduces or extends periods of inundation
3	Hydrology essentially unaltered

2.2.5 Variable V_5 – Size of Contiguous Forested Area

The BLH habitat analysis also takes forest patch size into consideration. Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. Larger forested areas provide higher quality habitat than smaller areas. Contiguous forest area class descriptions for BLH habitat analysis are the same as swamp habitat analysis (see Table 6). There are three forest patches that include seasonally tidal BLH on the flood side of the NFL. The sizes of those forest patches are 402.67 acres, 117.75 acres, and 224.55 acres. The average forest patch size is 248.32 acres. Thus, the averaged size of the contiguous forested area is a Class 4.

2.2.6 Variable V_6 – Suitability and Traversability of Surrounding Land Uses

Land use within 0.5 mile of the project area is considered and weighted to determine its effect on the habitat being analyzed (Table 13). Wildlife often use habitat adjacent to fresh marsh to forage or nest. Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). The existing right-of-way width for

the anticipated Proposed Action alignment was used as the baseline for determining the 0.5 mile wide buffer because at the time, no additional information was available. Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that it would change the weight of this variable in the WVA analysis. Details can be found in the land use calculation spreadsheet in Attachment 5.

Table 13. Land Use within 0.5 mile Buffer of Project Area for Seasonally Tidal BLH Habitat Analysis

Land Use	Percent of 0.5 mile wide buffer
BLH, other forested areas, marsh habitat, etc.	41.79
Abandoned agriculture, overgrown fields, dense cover, etc.	4.60
Pasture, hayfields, etc.	40.84
Active agriculture	1.03
Non-habitat: linear, residential, commercial, industrial development, etc.	11.74

2.2.7 Variable V_7 – Disturbance

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area. Descriptions of distance and type classes associated V_7 disturbance for BLH habitat analysis are the same as V_6 disturbance in the swamp habitat analysis (see Table 8). Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to >500 feet away, but insignificant (LADNR 1994).

The BLH habitat in the project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that yielded the most appropriate SI was utilized. There is BLH habitat on the flood side of the levee system in all sections except Section 2. Due to the size of the project area and its linear nature, the value was averaged by disturbance areas (Table 14). Again, the existing right-of-way width for the anticipated Proposed Action alignment was used as the baseline for determining disturbance distances because at the time, no additional information was available. Any future modifications to that buffer distance should not result in significant changes in the distance class portion of this variable to the degree that it would change the weight of this variable in the WVA analysis.

Table 14. Determination of V_7 Disturbance for Seasonally Tidal BLH Habitat Analysis

Area	Distance Class	Type Class
A (Section 1)	2	4
B (Section 1)	2	2
C (Section 1)	2	3
E (Section 3)	1	1
F (Section 4)	2	1
G (Section 5)	1	1
AVERAGE	**2**	**2**

The BLH WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

2.3 HYDROLOGICALLY ALTERED BLH HABITAT ASSESSMENT (DRY BLH)

BLH habitat within the existing flood protection system has been hydrologically altered. Data were collected from a total of 10 sites along the protected side of the NFL. Seven of the sites fall into three different classes of BLH successional stages, which are intermixed throughout the habitat area. Since

those BLH stage classes cannot be distinguished on aerial photography and because the BLH forests being analyzed are not evenly aged, data from all seven sites were averaged for this analysis. The remaining three sites are dominated by Chinese tallow, and were not included in this analysis. Sections 1, 4, and 5 contained hydrologically altered BLH habitat. In addition, the following data and assumptions were used to analyze the subsided ridge habitat. Scrub-shrub habitat in Section 4 was included in the hydrologically altered WVA because the area appears to be a transitional area between agricultural fields and hydrologically altered BLH habitat, and it was assumed that in 50 years the scrub/shrub habitat would grow into BLH habitat. Field site data sheets can be found in Attachment 2.

2.3.1 Variable V_1 – Tree Species Association

Two sites were considered to be at the Class 5 stage because the canopy consists of greater than 50 percent of mast or other edible seed producing trees, and hard mast producers constitute more than 20 percent of the canopy. Three sites were considered to be at the Class 2 stage because mast or other edible seed producing trees constitute between 25 percent and 50 percent of the canopy, but hard mast producers constitute less than 10 percent of the canopy. Two sites were considered to be at the Class 1 stage because less than 25 percent of the canopy consists of mast or other edible seed producing trees; or, the canopy consists of more than 50 percent soft mast but no hard mast. Values were averaged for an overall BLH stage of Class 4 for all FWOP TYs and FWP TY 1. Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4).

2.3.2 Variable V_2 – Stand Maturity

Stand maturity is based upon the average age or DBH of canopy-dominant and canopy co-dominant trees. Optimal conditions (i.e., SI=1) occur when the stand is approximately 50 years old or if the average DBH of stand is greater than 20 inches (LADNR 1994). In this case, average DBH was averaged across all sites because the age of the stand was unknown (Table 15). Details are provided in the DBH spreadsheets (Attachment 3) and Combined Field Site Data Spreadsheet (Attachment 4).

Table 15. V_2 Stand Maturity Projects for NFL Hydrologically Altered BLH Habitat Analysis

Condition	TY	Average DBH (inches)
FWOP	0	13.30
	1	13.57
	20	10.09
	50	18.50
FWP		
	0	13.30
	1	0
	20	0
	50	0

2.3.3 Variable V_3 – Understory/Midstory

The amount of understory and midstory coverage are important because they provide habitat for resting, foraging, and nesting for wildlife (LADNR 1994). Optimal conditions occur when the understory cover is between 30 and 60 percent, and when the midstory cover is between 20 and 50 percent (LADNR 1994). Percentages of understory and midstory were also averaged across sites (Table 16). Details are provided in the Combined Field Site Data Spreadsheet (Attachment 4). The understory and midstory consist of a mixture of hard and soft mast species, plus a large amount of Chinese tallow; therefore, the understory should decrease over time as seedlings mature and shade out the ground cover. The

midstory is expected to decrease as the mid-size trees grow into the canopy, but then is expected to remain consistent as seedlings grow into the midstory.

Table 16. V_3 Understory/Midstory Projections for Seasonally Tidal BLH Habitat Analysis

Condition	TY	Understory Percent	Midstory Percent
FWOP	0	42.9	53.6
	1	42.9	53.6
	20	35.7	43.6
	50	28.6	35.0
FWP			
	0	42.9	53.6
	1	0	0
	20	0	0
	50	0	0

2.3.4 Variable V_4 – Hydrology

There are three hydrology classes in BLH WVA analysis (see Table 12). These BLH habitats are within the existing flood protection system, but are not under a forced drainage system. Rather, they have drainage ditches and are no longer exposed to natural flooding events, and/or they experience reduced periods of inundation. As a result, hydrology was evaluated as Class 2 for all FWOP TYs and FWP TY 0.

2.3.5 Variable V_5 – Size of Contiguous Forested Area

The BLH habitat analysis also takes forest patch size into consideration. Corridors less than 75 feet wide do not constitute a break in the forested area contiguity. Larger forested areas provide higher quality habitat than smaller areas. Contiguous forest area class descriptions for BLH habitat analysis are the same as swamp habitat analysis (see Table 6). There are three forest patches that include hydrologically altered BLH habitat. The sizes of those forest patches are 573.41 acres, 167.80 acres, and 13.58 acres. The average forest patch size is 251.6 acres. Thus, the averaged size of the contiguous forested area is a Class 4 for all FWOP TYs and FWP TY 0.

2.3.6 Variable V_6 – Suitability and Traversability of Surrounding Land Uses

Open water was included with pasture/hayfields because it provides similar habitat benefits (e.g., drinking source, aquatic invertebrates, attracts/produces flying insects, etc.). The existing right-of-way width for the anticipated Proposed Action alignment was used as the baseline for determining the 0.5 mile buffer (see Table 13). Any future modifications to that alignment right-of-way buffer distance should not result in significant changes in percentages of land use to the degree that it would change the weight of this variable in the WVA analysis.

2.3.7 Variable V_7 – Disturbance

The effect of disturbance depends on the distance to the disturbance and the type of disturbance near the project area. Descriptions of distance and type classes associated V_7 disturbance for BLH habitat analysis are the same as V_6 disturbance in the swamp habitat analysis (see Table 8). Optimal conditions occur when any type of disturbance is greater than 500 feet away or when the type of disturbance is 0 to >500 feet away, but insignificant (LADNR 1994).

The BLH habitat in the project area is exposed to various disturbance type classes less than 500 feet away; therefore, the type/distance combination that yielded the most appropriate SI was utilized. There is BLH habitat on the protected side of the levee system in every section except Section 4. Due to the size of the project area and its linear nature, the value was averaged by disturbance areas (Table 17). These values were used for all FWOP TYs and FWP TY 0. Again, the existing right-of-way width for the anticipated Proposed Action was used as the baseline for determining disturbance distances. Any future modifications to that buffer distance should not result in significant changes in the distance class portion of this variable to the degree that it would change the weight of this variable in the WVA analysis.

Table 17. Determination of Variable V_7 Disturbance for Hydrologically Altered BLH Habitat Analysis

Area	Distance Class	Type Class
A (Section 1)	2	4
B (Section 1)	2	2
C (Section 1)	2	3
D (Section 2)	1	4
E (Section 3)	1	1
G (Section 5)	1	1
AVERAGE	**2**	**3**

The BLH WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

2.4 WET PASTURE HABITAT ASSESSMENT

The wet pasture within the project area consists of seasonally flooded, partially drained/ditched, emergent wetlands contained within the existing levee system. USACE's Habitat Evaluation System (HES) for open lands was used to calculate the AAHUs for this habitat type. The HES uses functional curves for determining a Habitat Quality Index (HQI) value for land use, diversity of land use, distance to cover, distance to wooded areas, frequency of flooding, tract size, and the perimeter development index. The HQI values are then entered into a formula to estimate the AAHUs. Due to the size of the project area and its linear nature, the value was averaged across all areas. Distances, land use, tract size, and sinuosity were calculated using 2008 DOQQ imagery in ArcGIS. This analysis was conducted in order to determine the value of these habitats to fish and wildlife resources. Agencies will determine an appropriate ratio to calculate mitigation. Sections 2 and 4 contained wet pasture habitat. The wet pasture spreadsheets for all sections and the resulting AAHUs can be found in Attachment 1.

2.5 FRESH-INTERMEDIATE MARSH ASSESSMENT

Open water habitat was included in the total project area for fresh/intermediate marsh WVAs. Only Section 1 contained fresh marsh located on the floodside of levee reaches.

2.5.1 Variable V_1 – Percent of Wetland Area Covered by Emergent Marsh

A high suitability index (i.e., SI=1) occurs when vegetative cover is near 100 percent and decreases in value with smaller emergent marsh percentages. Emergent marsh provides important resting, foraging, and breeding habitat for fish and wildlife species (Environmental Working Group 2009). In order to calculate percent emergent marsh, land loss rates from 1985 to 2009 for an expanded project boundary for each alternative were provided by U.S. Geological Survey (USGS). TY 0 was estimated at 2010 conditions and the loss rate was applied through TY 50 to calculate percent emergent marsh. The land loss worksheets for each alternative and levee reach can be seen in Attachment 6. Total project areas were provided by USACE based on 2007 USGS vegetation classification data. NMFS suggested that a 0

percent loss rate was applied to Alternative 2 and Alternative 3, Section 1 WVAs. For FWP conditions TY 1 through TY 50, it was assumed 0 percent emergent marsh as a result of all habitat being converted into levee as a result of the project.

2.5.2 Variable V_2 – Percent of Open Water Area Covered by Aquatic Vegetation

A high suitability index (i.e., SI=1) for fresh/intermediate marshes occur when 100 percent of the open water is dominated with aquatic vegetation and decreases with lower aquatic vegetation percentages. Data from field trips to Plaquemines Parish were used to calculate V_2. There was little (5 percent) to no submerged aquatic vegetation (SAV) observed in the field (Attachment 2). It was assumed that FWOP conditions may result in a small increase in SAV growth over 50 years (8 percent). However, SAV growth will be impacted by decrease of shallow water habitat due to RSLR and subsidence. For FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee as a result of the project.

2.5.3 Variable V_3 – Marsh Edge and Interspersion

Interspersion was calculated by consulting aerial photography within the project footprints, and comparing to sample illustrations provided in the CWPPR Wetland Value Assessment Methodology handbook (Environmental Working Group 2009). Descriptions of the different interspersion classes can be seen in Table 18.

Table 18. Description of V_3 Interspersion Classes for Marsh Habitat Analysis

Class	Description
1	High degree of interspersion in the form of tidal channels and small ponds
2	Numerous small ponds, but can be indicative of marsh break-up
3	Large ponds and open water areas; or carpet marsh containing no significant tidal channels, creeks, or ponds
4	Large ponds and open water areas with little surrounding marsh
5	Very small marsh islands (less than 5% emergent marsh), areas of almost entirely open water

FWOP conditions varied slightly between Alternative 2 and Alternative 3 as a result of Alternative 3's slightly larger footprint (Table 19). In general, however, marsh within the footprint for Alternative 2 and Alternative 3, Section 1 is dense, although there are small ponds and some area of open water. The majority is considered Class 1, with a small percent being considered Class 2 as a result of increased open water areas and presence of small ponds. No change would occur over 50 years for FWOP conditions because it was assumed that there was 0 percent land loss for Section 1. For FWP conditions TY 1 through TY 50, all interspersion values were evaluated as Class 5 in order to provide a sub-optimal value as a result of all marsh habitat being converted into levee.

Table 19. V_3 Interspersion Variables (FWOP) for NFL Fresh Marsh Habitat Analysis in Section 1

WVA/ Section	TY	Interspersion Variable	Comment
Alternative 2 - Section 1	TY 0	80%-C1, 20%-C2	Less Class 2 marsh is impacted in Alternative 2 as a result of a smaller footprint.
	TY 1	80%-C1, 20%-C2	
	TY 50	80%-C1, 20%-C2	
Alterative 3 - Section 1	TY 0	90%-C1, 10%-C2	
	TY 1	90%-C1, 10%-C2	
	TY 50	90%-C1, 10%-C2	

2.5.4 Variable V_4 – Percent Open Water Less than 1.5 Feet Deep

Percent open water less than 1.5 feet deep was observed to be quite high (90 percent) in the fresh/intermediate marshes visited in the field (Attachment 2). Optimal V_4 conditions occur at 80 to 90 percent open water less than 1.5 feet deep in fresh/intermediate marshes. It was assumed that by TY 50, the percent open water less than 1.5 feet deep would decrease (80 percent), due to subsidence and RSLR. For FWP conditions TY 1 through TY 50, it was assumed 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

2.5.5 Variable V_5 – Salinity

Mean salinity during the growing season (March-November) is used for fresh/intermediate marsh model because that is when high salinity is most detrimental to these marshes. Optimal conditions for fresh marsh under these conditions is less than 0.5 parts per thousand (ppt) for fresh marsh and 2.5 ppt or less for intermediate marsh. Salinity was collected from CWPRRA's Coastwide Reference Monitoring System (CRMS) website for station 0287. Salinity ranged from 0.94 ppt to a maximum of 2.16 ppt during the growing season (CRMS 2010). A previous project in the project area by the U.S. Environmental Protection Agency (EPA) (CWPPRA Bayou Dupont) estimated that the mean salinity during the growing season was 1.24 ppt (CRMS station 4103). A salinity of 1.0 ppt was used for both Alternative 2, Section 1 WVA and Alterative 3, Section 1 WVA for TY 0 through TY 50. For FWP conditions TY 1 through TY 50, a salinity of 5.5 ppt was used to provide a low quality SI as a result of all marsh habitat being converted into levee.

2.5.6 Variable V_6 – Aquatic Organism Access

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for V_6 occur when there are no obstructions or barriers to the project area and it is completely accessible (i.e., SI=1.000).

The Fresh Marsh WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

2.6 BRACKISH MARSH ASSESSMENT

Open water habitat was included in the total project area to analyze the brackish marsh habitat in Sections 4 and 5. Section 4 contained 0.0562 acre of intermediate marsh, but because of its small size, this marsh was analyzed with the brackish marsh and open water habitat.

2.6.1 Variable V_1 – Percent of Wetland Area Covered by Emergent Marsh

A high suitability index (i.e., SI=1) occurs when vegetative cover is near 100 percent and decreases in value with smaller emergent marsh percentages. Emergent marsh provides important resting, foraging,

and breeding habitat for fish and wildlife species (Environmental Working Group 2009). In order to calculate percent emergent marsh, land loss rates from 1985 to 2009 for an expanded project boundary for each alternative were provided by USGS. TY 0 was estimated at 2010 conditions and the loss rate was applied through TY 50 to calculate percent emergent marsh. The land loss worksheets for each alternative and levee reach can be seen in Attachment 6. Total project areas were provided by the USACE based on 2007 NWI habitat classification data. For FWP conditions, TY 1 through TY 50 was assumed 0 percent emergent marsh as a result of all habitat being converted into levee due to the construction of the project.

2.6.2 Variable V_2 – Percent of Open Water Area Covered by Aquatic Vegetation

Like the fresh/intermediate marsh WVA model, a high suitability index (i.e., SI=1) for brackish marshes occur when 100 percent of the open water is dominated with aquatic vegetation and decreases with lower aquatic vegetation percentages. Data from field trips in Plaquemines Parish were used to calculate V_2. There was little (5 percent) SAV observed in the field (Attachment 2). It was assumed that FWOP conditions may result in a small increase in SAV growth over 50 years (8 percent). FWP conditions TY 1 through TY 50, percent SAV was assumed to be 0 as a result of all marsh and open water habitat being filled and converted into levee.

2.6.3 Variable V_3 – Marsh Edge and Interspersion

Interspersion was calculated by consulting aerial photography within the project footprints, and comparing to sample illustrations provided in the CWPPR Wetland Value Assessment Methodology handbook (Environmental Working Group 2009). Descriptions of the different interspersion classes are provided in Table 18.

Most of the brackish marsh in Alternative 2/3, Section 4 and Section 5 project area is dense (Class 1), but there were also areas with slightly more open water in the form of marsh ponds and channels that were determined to be Class 2 or Class 3 (Table 20). Over 50 years, the marsh would continue to degrade. The interspersion variable for FWP TY 1 through TY 50 was evaluated as 100 percent Class 5 for Section 4 and Section 5.

Table 20. V_3 Interspersion Variables (FWOP) for NFL Brackish Marsh Habitat Analysis in Sections 4 and 5

WVA/ Section	TY	Interspersion Variable
Alternative 2/3- Section 4	TY 0	70%-C1, 30%-C3
	TY 1	70%-C1, 30%-C3
	TY 50	60%-C1, 40%-C3
Alternatives 2/3- Section 5	TY 0	90%-C1, 10%-C2
	TY 1	90%-C1, 10%-C2
	TY 50	35%-C1, 15%-C2, 50%-C3

2.6.4 Variable V_4 – Percent Open Water less than 1.5 Feet Deep

Percent open water less than 1.5 feet deep was observed to be low (8 percent) in the brackish marshes visited in the field. Optimal V_4 conditions occur when there is 70 to 80 percent shallow water. Percent open water less than 1.5 feet deep was determined from conditions observed in Plaquemines Parish in May 2010. Between 5 and 10 percent shallow water habitat was present in brackish marsh sites. It was assumed that some shallow water habitat would be lost over 50 years due to SLR and subsidence (5

percent). For FWP conditions TY 1 through TY 50, it was assumed 0 percent of open water less than 1.5 feet deep would be present as a result of conversion of this habitat into levee.

2.6.5 Variable V_5 – Salinity

Average annual salinity is used as the salinity parameter in the brackish marsh model. Optimal salinities occur between 0 and 10 ppt. Salinity data from a previous project in the area (CWPRRA Lake Hermitage WVA 11/14/2008) were used to estimate salinity for NFL WVAs (Table 21). Additional data was collected from CWPRRA's Coastwide Reference Monitoring System (CRMS) website to confirm estimate (CRMS 2010). An estimate of 5.0 ppt was used for the brackish marsh habitats in both Section 4 and 5 for FWOP TY 0 through TY 50. For FWP conditions TY 1 through TY 50, NMFS provided a sub-optimal salinity of 16 ppt for brackish marsh to provide low quality variable as a result of all marsh habitat being converted to levee as a result of the project.

Table 21. V_5 Salinity References for NFL Brackish Marsh Habitat Analysis, Sections 4 and 5

WVA	Marsh Type	Salinity	Reference
Alternative 2/3-Section 4	Brackish Marsh	5.0 ppt	CWPRRA Lake Hermitage WVA 11/14/2008, CRMS Stations 0276, 3601, 0263,0260
Alternative 2/3-Section 5	Brackish Marsh	5.0 ppt	CWPRRA Lake Hermitage WVA 11/14/2008, CRMS Stations 0260, 0258, 3680.

2.6.6 Variable V_6 – Aquatic organism access

Because the impacted marsh is located on the floodside of the levee, there were no obstacles that would prevent fish or other aquatic organisms from accessing the impacted marshes. Small ponds, channels, and canals provide access to the project area. Optimal conditions for V_6 occur when there are no obstructions or barriers to the project area and it is completely accessible.

The brackish marsh WVA model worksheets for all sections and the resulting AAHUs can be found in Attachment 1.

3.0 RESULTS

WVAs were analyzed by alternative and by each levee section within the Plaquemines Parish NFL System. Alternative 2, Section 1 and Alternative 3, Section 1 were analyzed separately because Alternative 3 proposed a 1 percent footprint instead of a 2 percent footprint. For the remaining Sections (2, 4, and 5), the footprints for Alternative 2 and Alternative 3 remained the same, and so were analyzed only once. Section 3 was analyzed with habitats in Section 4 because of its' small size. There were seven habitats analyzed within the Plaquemines Parish NFL system project area including the following: seasonally tidal BLH, hydrologically altered BLH, swamp, subsided ridge, wet pasture, fresh/intermediate marsh, and brackish marsh. Not all habitats were present in all sections of levee. The results of the WVA analysis can be found in Table 22.

Total impacts for Alternative 2 include a net change of -68.65 AAHUs for seasonally tidal BLH, -12.11 AAHUs for hydrologically altered BLH, -21.13 AAHUs for swamp, -17.12 AAHUs for subsided ridge, -0.62 AAHUs for wet pasture, -6.84 AAHUs for fresh marsh, and -8.92 AAHUs for brackish marsh. Impacts for Alternative 3 are the same for subsided ridge, wet pasture, and brackish marsh. However, the larger

footprint in Section 1 of Alternative 3 results in larger impacts for seasonally tidal BLH (-83.76 AAHUs), hydrologically altered BLH (-13.81 AAHUs), swamp (-57.42 AAHUs), and fresh marsh (-17.83 AAHUs).

Table 22. Summary of Impacts (Change in AAHUs [FWOP-FWP]) by Levee Section and Habitat

WVA	BLH (Wet)	BLH (Dry)	Swamp	Subsided Ridge	Wet Pasture	Fresh/ Intermediate Marsh	Brackish Marsh	
Alternative 2-Section 1	-10.27	-5.70	-21.13	N/A	N/A	-6.84	N/A	
Alternative 3-Section 1	-25.38	-7.4	-57.42	N/A	N/A	-17.83	N/A	
Alternative 2/3-Section 2	-0.06	N/A	N/A	N/A	-25.69	N/A	N/A	
Alternative 2/3-Section 4	-9.42	-6.09	N/A	-17.12	-24.93	N/A	-6.20	
Alternative 2/3-Section 5	-48.90	-0.32	N/A	N/A	N/A	N/A	-2.72	
TOTALS								**TOTAL IMPACTS (AAHUs)**
Proposed Action (Alternative 2)	**-68.65**	**-12.11**	**-21.13**	**-17.12**	**-50.62**	**-6.84**	**-8.92**	**-185.39**
Locally Preferred Plan (Alternative 3)	**-83.76**	**-13.81**	**-57.42**	**-17.12**	**-50.62**	**-17.83**	**-8.92**	**-249.48**

4.0 REFERENCES

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ATTACHMENT 1
WETLAND VALUE ASSESSMENT WORKSHEETS

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%), Section 1- BLH Floodside (all classes) Acres: 14.61

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 32		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 73.8	0.88	Midstory % 0		Midstory % 0		0.76	0.10	0.10
V4	Hydrology	Class 3	1.00	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =		HSI =				

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH Acres: 14.61

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 5	1.00	Class 5	1.00			
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 10.6	0.27	Age / dbh 10.87	0.29			
V3	Understory / Midstory	Understory % 32		Understory % 32		Understory % 26		1.00	1.00	0.88
		Midstory % 73.8	0.88	Midstory % 73.8	0.88	Midstory % 66	0.86	0.76	0.76	0.84
V4	Hydrology	Class 3	1.00	Class 3	1.00	Class 3	1.00			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =	0.63	HSI =	0.64			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 5	1.00	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 19.3	0.96	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 20		Understory %		Understory %		0.70
		Midstory % 61	0.80	Midstory %		Midstory %		0.89
V4	Hydrology	Class 3	1.00	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.87	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	14.61	0.62	9.10	
1	14.61	0.00	0.00	4.55
20	14.61	0.00	0.00	0.00
50	14.61	0.00	0.00	0.00
			Total CHUs =	4.55
			AAHUs =	0.09

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	14.61	0.62	9.10	
1	14.61	0.63	9.26	9.18
20	14.61	0.64	9.39	177.17
50	14.61	0.87	12.74	331.95
			Total CHUs =	518.30
			AAHUs =	10.37

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	4.55
B. Future Without Project CHUs =	518.30
Net Change (FWP - FWOP) =	-513.75

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.09
B. Future Without Project AAHUs =	10.37
Net Change (FWP - FWOP) =	-10.27

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%), Section 1- BLH protected side (all classes) Acres: 8.99

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance									
	Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =		HSI =				

Project: NFL. Alt 2 (2%), Section 1- BLH protected side (all cla

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance							
	Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%), Section 1- BLH protected side (Acres: 8.99

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh 13.57	0.56	Age dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =	0.68	HSI =	0.54			

Project..... Project: PlaqNFL - PROTECTED SIDE - all class BLH
FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 4	0.80	Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh 18.5	0.90	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.77	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%), Section 1- BLH protected side (all classes)

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	8.99	0.67	6.03	
1	8.99	0.00	0.00	3.01
20	8.99	0.00	0.00	0.00
50	8.99	0.00	0.00	0.00
			Total CHUs =	3.01
			AAHUs =	0.06

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	8.99	0.67	6.03	
1	8.99	0.68	6.11	6.07
20	8.99	0.54	4.89	104.46
50	8.99	0.77	6.94	177.44
			Total CHUs =	287.96
			AAHUs =	5.76

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	3.01
B. Future Without Project CHUs =	287.96
Net Change (FWP - FWOP) =	-284.95

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.06
B. Future Without Project AAHUs =	5.76
Net Change (FWP - FWOP) =	-5.70

COMMUNITY HABITAT SUITABILITY MODEL
Fresh Swamp

Project..... **PlaqNFL. Alt 2 (2%), Section 1, Swamp** Acres: 24.87

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 30 Class/Value	TY 30 SI			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	40	0.50	0	0.00	0	MARSH			
	Scrub shrub	24		0		0				
	Herbaceous	93		0		0				
V2	Maturity (input age or species composition and dbh)	Age	0.00	Age	0.00	Age	0.00			
		Cypress % 67		Cypress % 0		Cypress % 0				
		Cypress dbh 19.17		Cypress dbh 0		Cypress dbh 0		1	0	0
		Tupelo et al. % 33		Tupelo et al. % 0		Tupelo et al. % 0				
		Tupelo et al dbh 10.12	0.94	Tupelo et al dbh 0	0.95	Tupelo et al dbh 0	1.00	0.812	0	0
V3	Hydrology	Class 4	1.00	Class 1	0.10	Class 1	0.10			
V4	Forest Size	Class 4	0.80	Class	0.00	Class	0.00			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61	48	0.61	48	0.61			
	Abandoned Ag	2		2		2				
	Pasture / Hay	27		27		27				
	Active Ag	4		4		4				
	Development	19		19		19				
V6	Disturbance									
	Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.73	HSI =		HSI =				

Project..... PlaqNFL. Alt 2 (2%), Section 1, Swamp
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY	TY Class/Value	TY			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	0	MARSH		MARSH		MARSH			
	Scrub shrub	0								
	Herbaceous	0								
V2	Maturity (input age or species composition and dbh)	Age	0.00	Age	0.00	Age	0.00			
		Cypress %		Cypress %		Cypress %				
		Cypress dbh		Cypress dbh		Cypress dbh		0	0	0
		Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
		Tupelo et al dbh	1.00	Tupelo et al dbh		Tupelo et al dbh		0	0	0
V3	Hydrology	Class 1	0.10	Class		Class				
V4	Forest Size	Class 1	0.20	Class	ERROR	Class	ERROR			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61							
	Abandoned Ag	2								
	Pasture / Hay	27								
	Active Ag	4								
	Development	19								
V6	Disturbance									
	Type	Class 3	0.65	Class		Class				
	Distance	Class 2		Class		Class				
		HSI =		HSI =	#VALUE!	HSI =	#VALUE!			

COMMUNITY HABITAT SUITABILITY MODEL
Fresh Swamp

Project..... PlaqNFL. Alt 2 (2%), Section 1, Swamp Acres: 24.87

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 30 Class/Value	TY 30 SI			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	40	0.50	40	0.50	55	1.00			
	Scrub shrub	24		24		40				
	Herbaceous	93		93		90				
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
		67		67		55				
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition	19.17		19.46		22.79		1	1	1
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)	33		33		45				
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
		10.12	0.94	10.38	0.95	13.47	1.00	0.812	0.838	1
		Class		Class		Class				
V3	Hydrology	4	1.00	4	1.00	4	1.00			
		Class		Class		Class				
V4	Forest Size	4	0.80	4	0.80	4	0.80			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61	48	0.61	48	0.61			
	Abandoned Ag	2		2		2				
	Pasture / Hay	27		27		27				
	Active Ag	4		4		4				
	Development	19		19		19				
V6	Disturbance									
		Class		Class		Class				
	Type	3	0.65	3	0.65	3	0.65			
		Class		Class		Class				
	Distance	2		2		2				
		HSI =	0.73	**HSI =**	0.73	**HSI =**	0.92			

Project..... PlaqNFL. Alt 2 (2%), Section 1, Swamp
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	60	1.00		MARSH		MARSH			
	Scrub shrub	35								
	Herbaceous	90								
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
		50								
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition	28.63						1	0	0
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)	50								
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
		19.07	1.00					1	0	0
		Class		Class		Class				
V3	Hydrology	4	1.00							
		Class		Class		Class				
V4	Forest Size	4	0.80		ERROR		ERROR			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61							
	Abandoned Ag	2								
	Pasture / Hay	27								
	Active Ag	4								
	Development	19								
V6	Disturbance									
		Class		Class		Class				
	Type	3	0.65							
		Class		Class		Class				
	Distance	2								
		HSI =	0.92	**HSI =**	#VALUE!	**HSI =**	#VALUE!			

AAHU CALCULATION, Fresh Swamp

Project: PlaqNFL. Alt 2 (2%), Section 1, Swamp

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	24.87	0.73	18.04	
1	24.87	0.00	0.00	9.02
30	24.87	0.00	0.00	0.00
50	24.87	0.00	0.00	0.00
			Total CHUs =	9.02
			AAHUs =	0.18

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	24.87	0.73	18.04	
1	24.87	0.73	18.10	18.07
30	24.87	0.92	22.76	592.48
50	24.87	0.92	22.76	455.20
			Total CHUs =	1065.76
			AAHUs =	21.32

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	9.02
B. Future Without Project CHUs =	1065.76
Net Change (FWP - FWOP) =	**-1056.74**

NET CHANGE IN AAHU'S DUE TO PROJECT	
A. Future With Project AAHUs =	0.18
B. Future Without Project AAHUs =	21.32
Net Change (FWP - FWOP) =	**-21.13**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: PlaqNFL. Alt 2 (2%), Section 1, Fresh Marsh

Project Area: 10.43
Fresh..... 10.36
Open water 0.07
Total 10.43

Condition: Future Without Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	99.37	0.99	99.37	0.99	99.37	0.99			
V2	% Aquatic	5	0.15	5	0.15	8	0.17			
V3	Interspersion	%		%		%				
	Class 1	90	0.96	90	0.96	90	0.96	1	1	1
	Class 2	10		10		10		0.6	0.6	0.6
	Class 3							0	0	0
	Class 4							0	0	0
	Class 5							0	0	0
V4	%OW <= 1.5ft	90	1.00	90	1.00	80	1.00			
V5	Salinity (ppt)									
	fresh	1	0.90	1	0.90	1	0.90	0.90	0.90	0.90
	intermediate	0		0		0		1.00	1.00	1.00
V6	Access Value									
	fresh	1.00	0.99	1.00	0.99	1.00	0.99	1.00	1.00	1.00
	intermediate	0.00		0.00		0.00		0.20	0.20	0.20
	Emergent Marsh HSI =		0.98	EM HSI =	0.98	EM HSI =	0.98			
	Open Water HSI =		0.39	OW HSI =	0.39	OW HSI =	0.42			

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: PlaqNFL. Alt 2 (2%), Section 1, Fresh Marsh

Project Area: 10.43
Fresh..... 10.36
Open water 0.07
Total 10.43

Condition: Future With Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	99.37	0.99	0	0.10	0	0.10			
V2	% Aquatic	5	0.10	0	0.10	0	0.10			
V3	Interspersion	%		%		%				
	Class 1	90	0.96		0.10		0.10	1	0	0
	Class 2	10						0.6	0	0
	Class 3							0	0	0
	Class 4							0	0	0
	Class 5			100		100		0	0.1	0.1
V4	%OW <= 1.5ft	90	1.00	0	0.10	0	0.10			
V5	Salinity (ppt)									
	fresh	1	0.90	0	1.00	0	1.00	0.90	1.00	1.00
	intermediate	0		5.5		5.5		1.00	0.40	0.40
V6	Access Value									
	fresh	1.00	0.99	0.00	0.30	0.00	0.30	1.00	0.30	0.30
	intermediate	0.00		0.00		0.00		0.20	0.20	0.20
	Emergent Marsh HSI =		0.98	EM HSI =	0.22	EM HSI =	0.22			
	Open Water HSI =		0.35	OW HSI =	0.19	OW HSI =	0.19			

AAHU CALCULATION - EMERGENT MARSH

Project: PlaqNFL. Alt 2 (2%), Section 1, Fresh Marsh

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	10.36	0.98	10.15	
1	10.36	0.98	10.15	10.15
50	10.36	0.98	10.15	497.58
			AAHUs =	10.15

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	10.36	0.98	10.15	
1	0.00	0.22	0.00	3.76
50	0.00	0.22	0.00	0.00
			AAHUs	0.08

NET CHANGE IN AAHUs DUE TO PROJECT		
A. Future With Project Emergent Marsh AAHUs	=	0.08
B. Future Without Project Emergent Marsh AAHUs	=	10.15
Net Change (FWP - FWOP) =		-10.08

AAHU CALCULATION - OPEN WATER

Project: PlaqNFL. Alt 2 (2%), Section 1, Fresh Marsh

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.06	0.39	0.02	
1	0.06	0.39	0.02	0.02
50	0.06	0.42	0.03	1.20
			AAHUs =	0.02

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.06	0.35	0.02	
1	0.00	0.19	0.00	0.01
50	0.00	0.19	0.00	0.00
			AAHUs	0.00

NET CHANGE IN AAHUs DUE TO PROJECT		
A. Future With Project Open Water AAHUs	=	0.00
B. Future Without Project Open Water AAHUs	=	0.02
Net Change (FWP - FWOP) =		-0.02

TOTAL BENEFITS IN AAHUs DUE TO PROJECT		
A. Emergent Marsh Habitat Net AAHUs	=	-10.08
B. Open Water Habitat Net AAHUs	=	-0.02
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1		-6.84

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 3 (LPP), Section 1- BLH Floodside (all classes) Acres: 36.09

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 32		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 73.8	0.88	Midstory % 0		Midstory % 0		0.76	0.10	0.10
V4	Hydrology	Class 3	1.00	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =		HSI =				

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH Acres: 36.09

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 5	1.00	Class 5	1.00			
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 10.6	0.27	Age / dbh 10.87	0.29			
V3	Understory / Midstory	Understory % 32		Understory % 32		Understory % 26		1.00	1.00	0.88
		Midstory % 73.8	0.88	Midstory % 73.8	0.88	Midstory % 66	0.86	0.76	0.76	0.84
V4	Hydrology	Class 3	1.00	Class 3	1.00	Class 3	1.00			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =	0.63	HSI =	0.64			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 5	1.00	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 19.3	0.96	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 20		Understory %		Understory %		0.70
		Midstory % 61	0.80	Midstory %		Midstory %		0.89
V4	Hydrology	Class 3	1.00	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.87	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	36.09	0.62	22.48	
1	36.09	0.00	0.00	11.24
20	36.09	0.00	0.00	0.00
50	36.09	0.00	0.00	0.00
			Total CHUs =	11.24
			AAHUs =	0.22

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	36.09	0.62	22.48	
1	36.09	0.63	22.87	22.68
20	36.09	0.64	23.19	437.64
50	36.09	0.87	31.47	819.98
			Total CHUs =	1280.30
			AAHUs =	25.61

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	11.24
B. Future Without Project CHUs =	1280.30
Net Change (FWP - FWOP) =	-1269.06

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.22
B. Future Without Project AAHUs =	25.61
Net Change (FWP - FWOP) =	-25.38

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 3 (LPP), Section 1- BLH protected side (all classes) Acres: 11.67

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh	0.00	Age dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance									
	Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =		HSI =				

Project: ɥ NFL. Alt 3 (LPP), Section 1- BLH protected side (all class
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI		
V1	Species Assoc.	Class 1		Class		Class			
V2	Maturity (input age or dbh, not both)	Age dbh 0	0.00	Age dbh	0.00	Age dbh	0.00		
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10	
		Midstory % 0		Midstory %		Midstory %		0.10	
V4	Hydrology	Class 1	0.10	Class		Class			
V5	Forest Size	Class 1		Class		Class			
V6	Surrounding Land Use	Values %		Values %		Values %			
	Forest / marsh	42	0.61						
	Abandoned Ag	5							
	Pasture / Hay	41							
	Active Ag	1							
	Development	11.74							
V7	Disturbance								
	Type	Class 3	0.65	Class		Class			
	Distance	Class 2		Class		Class			
		HSI =		HSI =		HSI =			

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 3 (LPP), Section 1- BLH protected side (all c Acres: 11.67

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh 13.57	0.56	Age dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =	0.68	HSI =	0.54			

Project..... Project: PlaqNFL - PROTECTED SIDE - all class BLH
FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 4	0.80	Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh 18.5	0.90	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.77	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: Plaq NFL. Alt 3 (LPP), Section 1- BLH protected side (all classes)

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	11.67	0.67	7.82	
1	11.67	0.00	0.00	3.91
20	11.67	0.00	0.00	0.00
50	11.67	0.00	0.00	0.00
			Total CHUs =	3.91
			AAHUs =	0.08

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	11.67	0.67	7.82	
1	11.67	0.68	7.93	7.87
20	11.67	0.54	6.35	135.61
50	11.67	0.77	9.01	230.36
			Total CHUs =	373.84
			AAHUs =	7.48

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	3.91
B. Future Without Project CHUs =	373.84
Net Change (FWP - FWOP) =	-369.93

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.08
B. Future Without Project AAHUs =	7.48
Net Change (FWP - FWOP) =	-7.40

COMMUNITY HABITAT SUITABILITY MODEL
Fresh Swamp

Project..... **PlaqNFL. Alt 3 (LPP), Section 1, Swamp** Acres: 67.56

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 30 Class/Value	TY 30 SI			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	40	0.50	0	0.00	0	MARSH			
	Scrub shrub	24		0		0				
	Herbaceous	93		0		0				
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
		67		0		0				
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition	19.17		0		0		1	0	0
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)	33		0		0				
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
		10.12	0.94	0	0.95	0	1.00	0.812	0	0
		Class		Class		Class				
V3	Hydrology	4	1.00	1	0.10	1	0.10			
		Class		Class		Class				
V4	Forest Size	4	0.80		0.00		0.00			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61	48	0.61	48	0.61			
	Abandoned Ag	2		2		2				
	Pasture / Hay	27		27		27				
	Active Ag	4		4		4				
	Development	19		19		19				
V6	Disturbance									
		Class		Class		Class				
	Type	3	0.65	3	0.65	3	0.65			
		Class		Class		Class				
	Distance	2		2		2				
		HSI =	0.73	**HSI =**		**HSI =**				

Project..... PlaqNFL. Alt 3 (LPP), Section 1, Swamp
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY	TY Class/Value	TY			
V1	Stand Structure	% Cover		% Cover		% Cover				
	Overstory	0	MARSH		MARSH		MARSH			
	Scrub shrub	0								
	Herbaceous	0								
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition							0	0	0
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)									
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
			1.00					0	0	0
		Class		Class		Class				
V3	Hydrology	1	0.10							
		Class		Class		Class				
V4	Forest Size	1	0.20		ERROR		ERROR			
V5	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	48	0.61							
	Abandoned Ag	2								
	Pasture / Hay	27								
	Active Ag	4								
	Development	19								
V6	Disturbance									
		Class		Class		Class				
	Type	3	0.65							
		Class		Class		Class				
	Distance	2								
		HSI =		**HSI =**	#VALUE!	**HSI =**	#VALUE!			

COMMUNITY HABITAT SUITABILITY MODEL
Fresh Swamp

Project..... PlaqNFL. Alt 3 (LPP), Section 1, Swamp Acres: 67.56

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 30 Class/Value	TY 30 SI			
V1	Stand Structure									
		% Cover		% Cover		% Cover				
	Overstory	40	0.50	40	0.50	55	1.00			
	Scrub shrub	24		24		40				
	Herbaceous	93		93		90				
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
		67		67		55				
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition	19.17		19.46		22.79		1	1	1
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)	33		33		45				
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
		10.12	0.94	10.38	0.95	13.47	1.00	0.812	0.838	1
		Class		Class		Class				
V3	Hydrology	4	1.00	4	1.00	4	1.00			
		Class		Class		Class				
V4	Forest Size	4	0.80	4	0.80	4	0.80			
	Surrounding	Values %		Values %		Values %				
V5	Land Use									
	Forest / marsh	48	0.61	48	0.61	48	0.61			
	Abandoned Ag	2		2		2				
	Pasture / Hay	27		27		27				
	Active Ag	4		4		4				
	Development	19		19		19				
	Disturbance									
V6		Class		Class		Class				
	Type	3	0.65	3	0.65	3	0.65			
		Class		Class		Class				
	Distance	2		2		2				
		HSI =	0.73	**HSI =**	0.73	**HSI =**	0.92			

Project..... PlaqNFL. Alt 3 (LPP), Section 1, Swamp
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI			
V1	Stand Structure									
		% Cover		% Cover		% Cover				
	Overstory	60	1.00		MARSH		MARSH			
	Scrub shrub	35								
	Herbaceous	90								
V2	Maturity	Age		Age		Age				
	(input age		0.00		0.00		0.00			
	or	Cypress %		Cypress %		Cypress %				
		50								
	species	Cypress dbh		Cypress dbh		Cypress dbh				
	composition	28.63						1	0	0
	and	Tupelo et al. %		Tupelo et al. %		Tupelo et al. %				
	dbh)	50								
		Tupelo et al dbh		Tupelo et al dbh		Tupelo et al dbh				
		19.07	1.00					1	0	0
		Class		Class		Class				
V3	Hydrology	4	1.00							
		Class		Class		Class				
V4	Forest Size	4	0.80		ERROR		ERROR			
	Surrounding	Values %		Values %		Values %				
V5	Land Use									
	Forest / marsh	48	0.61							
	Abandoned Ag	2								
	Pasture / Hay	27								
	Active Ag	4								
	Development	19								
	Disturbance									
V6		Class		Class		Class				
	Type	3	0.65							
		Class		Class		Class				
	Distance	2								
		HSI =	0.92	**HSI =**	#VALUE!	**HSI =**	#VALUE!			

AAHU CALCULATION, Fresh Swamp

Project: PlaqNFL. Alt 3 (LPP), Section 1, Swamp

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	67.56	0.73	49.02	
1	67.56	0.00	0.00	24.51
30	67.56	0.00	0.00	0.00
50	67.56	0.00	0.00	0.00
			Total CHUs =	24.51
			AAHUs =	0.49

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	67.56	0.73	49.02	
1	67.56	0.73	49.18	49.10
30	67.56	0.92	61.84	1609.67
50	67.56	0.92	61.84	1236.71
			Total CHUs =	2895.48
			AAHUs =	57.91

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	24.51
B. Future Without Project CHUs =	2895.48
Net Change (FWP - FWOP) =	-2870.97

NET CHANGE IN AAHU'S DUE TO PROJECT	
A. Future With Project AAHUs =	0.49
B. Future Without Project AAHUs =	57.91
Net Change (FWP - FWOP) =	-57.42

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: Plaq Parish NFL-LPP Section 1-Fresh/Int

Condition: Future Without Project

Project Area: 27.53
Fresh..... 27.21
Open Water 0.32
Total 27.53

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	98.83	0.99	98.83	0.99	98.83	0.99			
V2	% Aquatic	5	0.15	5	0.15	8	0.17			
V3	Interspersion	%		%		%				
	Class 1	80	0.92	80	0.92	80	0.92	1	1	1
	Class 2	20		20		20		0.6	0.6	0.6
	Class 3							0	0	0
	Class 4							0	0	0
	Class 5							0	0	0
V4	%OW <= 1.5ft	90	1.00	90	1.00	80	1.00			
V5	Salinity (ppt)									
	fresh	1	0.90	1	0.90	1	0.90	0.90	0.90	0.90
	intermediate	0		0		0		1.00	1.00	1.00
V6	Access Value									
	fresh	1.00	0.99	1.00	0.99	1.00	0.99	1.00	1.00	1.00
	intermediate	0.00		0.00		0.00		0.20	0.20	0.20
	Emergent Marsh HSI	=	**0.97**	**EM HSI =**	**0.97**	**EM HSI =**	**0.97**			
	Open Water HSI	=	**0.39**	**OW HSI =**	**0.39**	**OW HSI =**	**0.42**			

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Fresh/Intermediate Marsh

Project: Plaq Parish NFL-LPP Section 1-Fresh/Int

Condition: Future With Project

Project Area: 27.53
Fresh..... 27.21
Open Water 0.32
Total 27.53

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	98.83	0.99	0	0.10	0	0.10			
V2	% Aquatic	5	0.15	0	0.10	0	0.10			
V3	Interspersion	%		%		%				
	Class 1	80	0.92		0.10		0.10	1	0	0
	Class 2	20						0.6	0	0
	Class 3							0	0	0
	Class 4							0	0	0
	Class 5			100		100		0	0.1	0.1
V4	%OW <= 1.5ft	90	1.00	0	0.10	0	0.10			
V5	Salinity (ppt)									
	fresh	1	0.90	0	0.99	0	0.99	0.90	1.00	1.00
	intermediate	0		5.5		5.5		1.00	0.40	0.40
V6	Access Value									
	fresh	1.00	0.99	0.00	0.30	0.00	0.30	1.00	0.30	0.30
	intermediate	0.00		0.00		0.00		0.20	0.20	0.20
	Emergent Marsh HSI	=	**0.97**	**EM HSI =**	**0.21**	**EM HSI =**	**0.21**			
	Open Water HSI	=	**0.39**	**OW HSI =**	**0.19**	**OW HSI =**	**0.19**			

AAHU CALCULATION - EMERGENT MARSH

Project: Plaq Parish NFL-LPP Section 1-Fresh/Int

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	27.21	0.97	26.45	
1	27.21	0.97	26.45	26.45
50	27.21	0.97	26.45	1296.08
			AAHUs =	26.45

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	27.21	0.97	26.45	
1	0.00	0.21	0.00	9.79
50	0.00	0.21	0.00	0.00
			AAHUs	0.20

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	0.20
B. Future Without Project Emergent Marsh AAHUs =	26.45
Net Change (FWP - FWOP) =	**-26.25**

AAHU CALCULATION - OPEN WATER

Project: Plaq Parish NFL-LPP Section 1-Fresh/Int

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.32	0.39	0.13	
1	0.32	0.39	0.13	0.13
50	0.32	0.42	0.13	6.33
			AAHUs =	0.13

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.32	0.39	0.13	
1	0.00	0.19	0.00	0.05
50	0.00	0.19	0.00	0.00
			AAHUs	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	0.00
B. Future Without Project Open Water AAHUs =	0.13
Net Change (FWP - FWOP) =	**-0.13**

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-26.25
B. Open Water Habitat Net AAHUs =	-0.13
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	**-17.83**

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 2- BLH Floodside (all clas Acres: 0.08

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 32		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 73.8	0.88	Midstory % 0		Midstory % 0		0.76	0.10	0.10
V4	Hydrology	Class 3	1.00	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =		HSI =				

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH Acres: 0.08

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 5	1.00	Class 5	1.00			
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 10.6	0.27	Age / dbh 10.87	0.29			
V3	Understory / Midstory	Understory % 32		Understory % 32		Understory % 26		1.00	1.00	0.88
		Midstory % 73.8	0.88	Midstory % 73.8	0.88	Midstory % 66	0.86	0.76	0.76	0.84
V4	Hydrology	Class 3	1.00	Class 3	1.00	Class 3	1.00			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =	0.63	HSI =	0.64			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 5	1.00	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 19.3	0.96	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 20		Understory %		Understory %		0.70
		Midstory % 61	0.80	Midstory %		Midstory %		0.89
V4	Hydrology	Class 3	1.00	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.87	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.08	0.62	0.05	
1	0.08	0.00	0.00	0.02
20	0.08	0.00	0.00	0.00
50	0.08	0.00	0.00	0.00
			Total CHUs =	0.02
			AAHUs =	0.00

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.08	0.62	0.05	
1	0.08	0.63	0.05	0.05
20	0.08	0.64	0.05	0.95
50	0.08	0.87	0.07	1.78
			Total CHUs =	2.78
			AAHUs =	0.06

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	0.02
B. Future Without Project CHUs =	2.78
Net Change (FWP - FWOP) =	-2.75

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.00
B. Future Without Project AAHUs =	0.06
Net Change (FWP - FWOP) =	-0.06

Project: Plaq NFL. A Alt 2 (2%) & Alt 3 (LPP), Section 2, Wet Pasture
SUMMARY

SITE: Averaged all sites-

Wet - openlands
Future w/out

TY	ACRES	HQI	HU'S	TOTAL HU'S
0	73.56	0.62	45.61	
1	73.56	0.62	45.61	45.61
20	73.56	0.62	45.61	866.59
50	73.56	0.62	45.61	1368.30
70			0.00	304.07
100			0.00	0.00
			AAHU'S	25.85

Wet - openlands
Future with

TY	ACRES	HQI	HU'S	TOTAL HU'S
0	73.56	0.62	45.61	
1	0.00	0.00	0.00	15.20
20	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00
70			0.00	0.00
100			0.00	0.00
			AAHU'S	0.15

CHANGE IN AAHU'S 25.69

FUTURE DATA

Site S_Sect4 and T_Sect4

Variable		Data	TY0 HQI	TY1 HQI	TY20 HQI	TY50 HQI	TY70 HQI	TY100 HQI	weight
land use		pasture	0.65	0.65	0.65	0.65			15.00
diversity		pasture and open water	0.40	0.40	0.40	0.40			15.00
cover	feet	approx. 400 ft to marsh	0.59	0.59	0.59	0.59			15.00
forest	feet	greater than 900 ft away	0.00	0.00	0.00	0.00			14.00
flooding	interval-yr	annually	1.00	1.00	1.00	1.00			14.00
tract size	acres	851.49	0.39	0.39	0.39	0.39			13.00
sinuosity	feet	158810.80	0.90	0.90	0.90	0.90			14.00
HQI			0.56	0.56	0.56	0.56	0.00	0.00	

Site R_Sect2

Variable		Data	TY0 HQI	TY1 HQI	TY20 HQI	TY50 HQI	TY70 HQI	TY100 HQI	weight
land use		pasture	0.65	0.65	0.65	0.65			15.00
diversity		pasture and open water	0.40	0.40	0.40	0.40			15.00
cover	feet	approx. 330 ft to swamp	0.69	0.69	0.69	0.69			15.00
forest	feet	approx. 330 ft to swamp	0.73	0.73	0.73	0.73			14.00
flooding	interval-yr	annually	1.00	1.00	1.00	1.00			14.00
tract size	acres	604.75	0.49	0.49	0.49	0.49			13.00
sinuosity	feet	111222.30	0.90	0.90	0.90	0.90			14.00
HQI			0.69	0.69	0.69	0.69	0.00	0.00	

DATA

Site:	S_Sect4 and T_Sect4				
Variable		Data	HQI	weight	Score
land use		pasture	0.65	15.00	9.75
diversity		pasture and open water	0.40	15.00	6.00
cover	feet	approx. 400 ft to marsh	0.59	15.00	8.85
forest	feet	greater than 900 ft away	0.00	14.00	0.00
flooding	interval-yr	annually	1.00	14.00	14.00
tract size	acres	851.49	0.39	13.00	5.07
sinuosity	feet	158810.80	0.90	14.00	12.60
				100.00	56.27
					0.56

Site	R_Sect2				
Variable		Data	HQI	weight	Score
land use		pasture	0.65	15.00	9.75
diversity		pasture and open water	0.40	15.00	6.00
cover	feet	approx. 330 ft to swamp	0.69	15.00	10.35
forest	feet	approx. 330 ft to swamp	0.73	14.00	10.22
flooding	interval-yr	annually	1.00	14.00	14.00
tract size	acres	604.75	0.49	13.00	6.37
sinuosity	feet	111222.30	0.90	14.00	12.60
				100.00	69.29
					0.69

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4- BLH Floodside (all class Acres: 13.39

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 32		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 73.8	0.88	Midstory % 0		Midstory % 0		0.76	0.10	0.10
V4	Hydrology	Class 3	1.00	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance									
	Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =		HSI =				

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance							
	Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH Acres: 13.39

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 5	1.00	Class 5	1.00			
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 10.6	0.27	Age / dbh 10.87	0.29			
V3	Understory / Midstory	Understory % 32		Understory % 32		Understory % 26		1.00	1.00	0.88
		Midstory % 73.8	0.88	Midstory % 73.8	0.88	Midstory % 66	0.86	0.76	0.76	0.84
V4	Hydrology	Class 3	1.00	Class 3	1.00	Class 3	1.00			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =	0.63	HSI =	0.64			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 5	1.00	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 19.3	0.96	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 20		Understory %		Understory %		0.70
		Midstory % 61	0.80	Midstory %		Midstory %		0.89
V4	Hydrology	Class 3	1.00	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.87	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	13.39	0.62	8.34	
1	13.39	0.00	0.00	4.17
20	13.39	0.00	0.00	0.00
50	13.39	0.00	0.00	0.00
			Total CHUs =	4.17
			AAHUs =	0.08

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	13.39	0.62	8.34	
1	13.39	0.63	8.49	8.41
20	13.39	0.64	8.60	162.35
50	13.39	0.87	11.68	304.18
			Total CHUs =	474.94
			AAHUs =	9.50

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	4.17
B. Future Without Project CHUs =	474.94
Net Change (FWP - FWOP) =	-470.77

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.08
B. Future Without Project AAHUs =	9.50
Net Change (FWP - FWOP) =	-9.42

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 4- BLH protected side (al Acres: 9.61

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh	0.00	Age dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =		HSI =				

Project: Alt 2 (2%) & Alt 3 (LPP), Section 4- BLH protected side
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh 0	0.00	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 4- BLH pr Acres: 9.61

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh 13.57	0.56	Age / dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =	0.68	HSI =	0.54			

Project..... Project: PlaqNFL - PROTECTED SIDE - all class BLH
FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 4	0.80	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 18.5	0.90	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.77	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 4- BLH protected side (all classes)

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	9.61	0.67	6.44	
1	9.61	0.00	0.00	3.22
20	9.61	0.00	0.00	0.00
50	9.61	0.00	0.00	0.00
			Total CHUs =	3.22
			AAHUs =	0.06

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	9.61	0.67	6.44	
1	9.61	0.68	6.53	6.48
20	9.61	0.54	5.23	111.66
50	9.61	0.77	7.42	189.66
			Total CHUs =	307.80
			AAHUs =	6.16

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	3.22
B. Future Without Project CHUs =	307.80
Net Change (FWP - FWOP) =	-304.58

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.06
B. Future Without Project AAHUs =	6.16
Net Change (FWP - FWOP) =	**-6.09**

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, Wet Pasture
SUMMARY

SITE: Averaged all sites

Wet - openlands
Future w/out

TY	ACRES	HQI	HU'S	TOTAL HU'S
0	71.38	0.62	44.26	
1	71.38	0.62	44.26	44.26
20	71.38	0.62	44.26	840.85
50	71.38	0.62	44.26	1327.66
70			0.00	295.03
100			0.00	0.00
			AAHU'S	25.08

Wet - openlands
Future with

TY	ACRES	HQI	HU'S	TOTAL HU'S
0	71.38	0.62	44.26	
1	0.00	0.00	0.00	14.75
20	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00
70			0.00	0.00
100			0.00	0.00
			AAHU'S	0.15

CHANGE IN AAHU'S 24.93

FUTURE DATA

Site S_Sect4 and T_Sect4

Variable		Data	TY0 HQI	TY1 HQI	TY20 HQI	TY50 HQI	TY70 HQI	TY100 HQI	weight
land use		pasture	0.65	0.65	0.65	0.65			15.00
diversity		pasture and op	0.40	0.40	0.40	0.40			15.00
cover	feet	approx. 400 ft t	0.59	0.59	0.59	0.59			15.00
forest	feet	greater than 9(	0.00	0.00	0.00	0.00			14.00
flooding	interval-yr	annually	1.00	1.00	1.00	1.00			14.00
tract size	acres	851.49	0.39	0.39	0.39	0.39			13.00
sinuosity	feet	158810.80	0.90	0.90	0.90	0.90			14.00
HQI			0.56	0.56	0.56	0.56	0.00	0.00	

Site R_Sect2

Variable		Data	TY0 HQI	TY1 HQI	TY20 HQI	TY50 HQI	TY70 HQI	TY100 HQI	weight
land use		pasture	0.65	0.65	0.65	0.65			15.00
diversity		pasture and op	0.40	0.40	0.40	0.40			15.00
cover	feet	approx. 330 ft t	0.69	0.69	0.69	0.69			15.00
forest	feet	approx. 330 ft t	0.73	0.73	0.73	0.73			14.00
flooding	interval-yr	annually	1.00	1.00	1.00	1.00			14.00
tract size	acres	604.75	0.49	0.49	0.49	0.49			13.00
sinuosity	feet	111222.30	0.90	0.90	0.90	0.90			14.00
HQI			0.69	0.69	0.69	0.69	0.00	0.00	

DATA

Site:	S_Sect4 and T_Sect4				
Variable		Data	HQI	weight	Score
land use		pasture	0.65	15.00	9.75
diversity		pasture and op	0.40	15.00	6.00
cover	feet	approx. 400 ft	0.59	15.00	8.85
forest	feet	greater than 9(	0.00	14.00	0.00
flooding	interval-yr	annually	1.00	14.00	14.00
tract size	acres	851.49	0.39	13.00	5.07
sinuosity	feet	158810.80	0.90	14.00	12.60
				100.00	56.27
					0.56

Site	R_Sect2				
Variable		Data	HQI	weight	Score
land use		pasture	0.65	15.00	9.75
diversity		pasture and op	0.40	15.00	6.00
cover	feet	approx. 330 ft	0.69	15.00	10.35
forest	feet	approx. 330 ft	0.73	14.00	10.22
flooding	interval-yr	annually	1.00	14.00	14.00
tract size	acres	604.75	0.49	13.00	6.37
sinuosity	feet	111222.30	0.90	14.00	12.60
				100.00	69.29
					0.69

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, subside Acres: 26.95

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 2	0.40	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age dbh 13.3	0.53	Age dbh	0.00	Age dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.56	HSI =		HSI =				

Project: qNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, subsided ri
FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age dbh 0	0.00	Age dbh	0.00	Age dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, subside Acres: 26.95

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh 13.57	0.56	Age / dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =	0.68	HSI =	0.54			

Project..... Project: PlaqNFL - PROTECTED SIDE - all class BLH
FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 4	0.80	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 18.5	0.90	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.77	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, subsided ridge

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	26.95	0.56	15.02	
1	26.95	0.00	0.00	7.51
20	26.95	0.00	0.00	0.00
50	26.95	0.00	0.00	0.00
			Total CHUs =	7.51
			AAHUs =	0.15

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	26.95	0.67	18.07	
1	26.95	0.68	18.31	18.19
20	26.95	0.54	14.66	313.19
50	26.95	0.77	20.81	532.01
			Total CHUs =	863.38
			AAHUs =	17.27

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	7.51
B. Future Without Project CHUs =	863.38
Net Change (FWP - FWOP) =	-855.87

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.15
B. Future Without Project AAHUs =	17.27
Net Change (FWP - FWOP) =	-17.12

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, Brackish Marsh

Project Area: 14.91

brackish marsh	10.84
Int Marsh	0.05
Open Water	4.01

Condition: Future Without Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	73.04	0.76	72.77	0.75	60.61	0.65			
V2	% Aquatic	5	0.15	5	0.15	8	0.17			
V3	Interspersion	%		%		%				
	Class 1	70	0.82	70	0.82	60	0.76	1	1	1
	Class 2							0	0	0
	Class 3	30		30		40		0.4	0.4	0.4
	Class 4							0	0	0
	Class 5							0	0	0
V4	%OW <= 1.5ft	8	0.20	8	0.20	5	0.16			
V5	Salinity (ppt)	5	1.00	5	1.00	5	1.00			
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00			
	Emergent Marsh HSI	**=**	**0.83**	**EM HSI =**	**0.83**	**EM HSI =**	**0.75**			
	Open Water HSI	**=**	**0.39**	**OW HSI =**	**0.39**	**OW HSI =**	**0.41**			

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, Brackish Marsh

Project Area: 14.91

Condition: Future With Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	73.04	0.76	0	0.10	0	0.10			
V2	% Aquatic	5	0.15	0	0.10	0	0.10			
V3	Interspersion	%		%		%				
	Class 1	70	0.82		0.10		0.10	1	0	0
	Class 2							0	0	0
	Class 3	30						0.4	0	0
	Class 4							0	0	0
	Class 5			100		100		0	0.1	0.1
V4	%OW <= 1.5ft	8	0.20	0	0.10	0	0.10			
V5	Salinity (ppt)	5	1.00	16	0.10	16	0.10			
V6	Access Value	1.00	1.00	0.00	0.10	0.00	0.10			
	Emergent Marsh HSI	**=**	**0.83**	**EM HSI =**	**0.10**	**EM HSI =**	**0.10**			
	Open Water HSI	**=**	**0.39**	**OW HSI =**	**0.10**	**OW HSI =**	**0.10**			

AAHU CALCULATION - EMERGENT MARSH

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, Brackish Marsh

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	10.89	0.83	9.04	
1	10.85	0.83	8.99	9.02
50	9.04	0.75	6.79	385.48
			AAHUs =	7.89

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	10.89	0.83	9.04	
1	0.00	0.10	0.00	3.20
50	0.00	0.10	0.00	0.00
			AAHUs	0.06

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	0.06
B. Future Without Project Emergent Marsh AAHUs =	7.89
Net Change (FWP - FWOP) =	-7.83

AAHU CALCULATION - OPEN WATER

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 4, Brackish Marsh

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	4.02	0.39	1.58	
1	4.06	0.39	1.60	1.59
50	5.87	0.41	2.42	98.31
			AAHUs =	2.00

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	4.02	0.39	1.58	
1	0.00	0.10	0.00	0.59
50	0.00	0.10	0.00	0.00
			AAHUs	0.01

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	0.01
B. Future Without Project Open Water AAHUs =	2.00
Net Change (FWP - FWOP) =	-1.99

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-7.83
B. Open Water Habitat Net AAHUs =	-1.99
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-6.20

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 5- BLH Floodside (all clas Acres: 69.52

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 0	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 32		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 73.8	0.88	Midstory % 0		Midstory % 0		0.76	0.10	0.10
V4	Hydrology	Class 3	1.00	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =		HSI =				

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH Acres: 69.52

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 5	1.00	Class 5	1.00	Class 5	1.00			
V2	Maturity (input age or dbh, not both)	Age / dbh 10.34	0.26	Age / dbh 10.6	0.27	Age / dbh 10.87	0.29			
V3	Understory / Midstory	Understory % 32		Understory % 32		Understory % 26		1.00	1.00	0.88
		Midstory % 73.8	0.88	Midstory % 73.8	0.88	Midstory % 66	0.86	0.76	0.76	0.84
V4	Hydrology	Class 3	1.00	Class 3	1.00	Class 3	1.00			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 2	0.50	Class 2	0.50	Class 2	0.50			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.62	HSI =	0.63	HSI =	0.64			

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 5	1.00	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 19.3	0.96	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 20		Understory %		Understory %		0.70
		Midstory % 61	0.80	Midstory %		Midstory %		0.89
V4	Hydrology	Class 3	1.00	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 2	0.50	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.87	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: PlaqNFL - FLOOD SIDE - All Classes of BLH

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	69.52	0.62	43.30	
1	69.52	0.00	0.00	21.65
20	69.52	0.00	0.00	0.00
50	69.52	0.00	0.00	0.00
			Total CHUs =	21.65
			AAHUs =	0.43

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	69.52	0.62	43.30	
1	69.52	0.63	44.07	43.68
20	69.52	0.64	44.68	843.09
50	69.52	0.87	60.63	1579.65
			Total CHUs =	2466.42
			AAHUs =	49.33

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	21.65
B. Future Without Project CHUs =	2466.42
Net Change (FWP - FWOP) =	-2444.77

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.43
B. Future Without Project AAHUs =	49.33
Net Change (FWP - FWOP) =	-48.90

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 5- BLH protected side (all classes) Acres: 0.50

Condition: Future With Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 1		Class 1				
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh	0.00	Age / dbh 0	0.00			
V3	Understory / Midstory	Understory % 42.9		Understory % 0		Understory % 0		1.00	0.10	0.10
		Midstory % 53.6	0.98	Midstory % 0		Midstory % 0		0.96	0.10	0.10
V4	Hydrology	Class 2	0.50	Class 1	0.10	Class 1	0.10			
V5	Forest Size	Class 4	0.80	Class 1		Class 1				
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance									
	Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =		HSI =				

Project: NFL. Alt 2 (2%) & Alt 3 (LPP), Section 5- BLH protected side (all clas

FWP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 1		Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 0	0.00	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 0		Understory %		Understory %		0.10
		Midstory % 0		Midstory %		Midstory %		0.10
V4	Hydrology	Class 1	0.10	Class		Class		
V5	Forest Size	Class 1		Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance							
	Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =		HSI =		HSI =		

COMMUNITY HABITAT SUITABILITY MODEL
Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 5- BLH protected side (all classes) Acres: 0.50

Condition: Future Without Project

Variable		TY 0 Class/Value	TY 0 SI	TY 1 Class/Value	TY 1 SI	TY 20 Class/Value	TY 20 SI			
V1	Species Assoc.	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V2	Maturity (input age or dbh, not both)	Age / dbh 13.3	0.53	Age / dbh 13.57	0.56	Age / dbh 10.09	0.24			
V3	Understory / Midstory	Understory % 42.9		Understory % 42.9		Understory % 35.7		1.00	1.00	1.00
		Midstory % 53.6	0.98	Midstory % 53.6	0.98	Midstory % 43.6	1.00	0.96	0.96	1.00
V4	Hydrology	Class 2	0.50	Class 2	0.50	Class 2	0.50			
V5	Forest Size	Class 4	0.80	Class 4	0.80	Class 4	0.80			
V6	Surrounding Land Use	Values %		Values %		Values %				
	Forest / marsh	42	0.61	42	0.61	42	0.61			
	Abandoned Ag	5		5		5				
	Pasture / Hay	41		41		41				
	Active Ag	1		1		1				
	Development	11.74		11.74		11.74				
V7	Disturbance Type	Class 3	0.65	Class 3	0.65	Class 3	0.65			
	Distance	Class 2		Class 2		Class 2				
		HSI =	0.67	HSI =	0.68	HSI =	0.54			

Project..... Project: PlaqNFL - PROTECTED SIDE - all class BLH
FWOP

Variable		TY 50 Class/Value	TY 50 SI	TY Class/Value	TY SI	TY Class/Value	TY SI	
V1	Species Assoc.	Class 4	0.80	Class		Class		
V2	Maturity (input age or dbh, not both)	Age / dbh 18.5	0.90	Age / dbh	0.00	Age / dbh	0.00	
V3	Understory / Midstory	Understory % 28.6		Understory %		Understory %		0.96
		Midstory % 35	0.98	Midstory %		Midstory %		1.00
V4	Hydrology	Class 2	0.50	Class		Class		
V5	Forest Size	Class 4	0.80	Class		Class		
V6	Surrounding Land Use	Values %		Values %		Values %		
	Forest / marsh	42	0.61					
	Abandoned Ag	5						
	Pasture / Hay	41						
	Active Ag	1						
	Development	11.74						
V7	Disturbance Type	Class 3	0.65	Class		Class		
	Distance	Class 2		Class		Class		
		HSI =	0.77	HSI =		HSI =		

AAHU CALCULATION, Bottomland Hardwoods

Project: Plaq NFL. Alt 2 (2%) & Alt 3 (LPP), Section 5- BLH protected side (all classes)

Future With Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.50	0.67	0.33	
1	0.50	0.00	0.00	0.17
20	0.50	0.00	0.00	0.00
50	0.50	0.00	0.00	0.00
			Total CHUs =	0.17
			AAHUs =	0.00

Future Without Project			Total	Cummulative
TY	Acres	x HSI	HUs	HUs
0	0.50	0.67	0.33	
1	0.50	0.68	0.34	0.34
20	0.50	0.54	0.27	5.79
50	0.50	0.77	0.38	9.83
			Total CHUs =	15.96
			AAHUs =	0.32

NET CHANGE IN CHUs DUE TO PROJECT	
A. Future With Project CHUs =	0.17
B. Future Without Project CHUs =	15.96
Net Change (FWP - FWOP) =	-15.79

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project AAHUs =	0.00
B. Future Without Project AAHUs =	0.32
Net Change (FWP - FWOP) =	**-0.32**

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 5, Brackish Marsh

Project Area: 6.16
brackish marsh 5.27
open water 0.9

Condition: Future Without Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	85.39	0.87	84.62	0.86	54.4	0.59			
V2	% Aquatic	5	0.15	5	0.15	8	0.17			
V3	Interspersion	%		%		%				
	Class 1	90	0.96	90	0.96	35	0.64	1	1	1
	Class 2	10		10		15		0.6	0.6	0.6
	Class 3					50		0	0	0.4
	Class 4							0	0	0
	Class 5							0	0	0
V4	%OW <= 1.5ft	8	0.20	8	0.20	5	0.16			
V5	Salinity (ppt)	5	1.00	5	1.00	5	1.00			
V6	Access Value	1.00	1.00	1.00	1.00	1.00	1.00			
	Emergent Marsh HSI =		0.92	EM HSI =	0.91	EM HSI =	0.70			
	Open Water HSI =		0.40	OW HSI =	0.40	OW HSI =	0.40			

WETLAND VALUE ASSESSMENT COMMUNITY MODEL
Brackish Marsh

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 5, Brackish Marsh

Project Area: 6.16

Condition: Future With Project

Variable		TY 0 Value	TY 0 SI	TY 1 Value	TY 1 SI	TY 50 Value	TY 50 SI			
V1	% Emergent	85.39	0.87	0	0.10	0	0.10			
V2	% Aquatic	5	0.15	0	0.10	0	0.10			
V3	Interspersion	%		%		%				
	Class 1	90	0.96		0.10		0.10	1	0	0
	Class 2	10						0.6	0	0
	Class 3							0	0	0
	Class 4							0	0	0
	Class 5			100		100		0	0.1	0.1
V4	%OW <= 1.5ft	8	0.20	0	0.10	0	0.10			
V5	Salinity (ppt)	5	1.00	16	0.10	16	0.10			
V6	Access Value	1.00	1.00	0.00	0.10	0.00	0.10			
	Emergent Marsh HSI =		0.92	EM HSI =	0.10	EM HSI =	0.10			
	Open Water HSI =		0.40	OW HSI =	0.10	OW HSI =	0.10			

AAHU CALCULATION - EMERGENT MARSH

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 5, Brackish Marsh

Future Without Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	5.26	0.92	4.82	
1	5.21	0.91	4.75	4.78
50	3.35	0.70	2.35	170.60
			AAHUs =	3.51

Future With Project			Total	Cummulative
TY	Marsh Acres	x HSI	HUs	HUs
0	5.26	0.92	4.82	
1	0.00	0.10	0.00	1.69
50	0.00	0.10	0.00	0.00
			AAHUs	0.03

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Emergent Marsh AAHUs =	0.03
B. Future Without Project Emergent Marsh AAHUs =	3.51
Net Change (FWP - FWOP) =	-3.47

AAHU CALCULATION - OPEN WATER

Project: PlaqNFL. Alt 2 (2%) & Alt 3 (LPP), Section 5, Brackish Marsh

Future Without Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.90	0.40	0.36	
1	0.95	0.40	0.38	0.37
50	2.81	0.40	1.14	37.24
			AAHUs =	0.75

Future With Project			Total	Cummulative
TY	Water Acres	x HSI	HUs	HUs
0	0.90	0.40	0.36	
1	0.00	0.10	0.00	0.14
50	0.00	0.10	0.00	0.00
			AAHUs	0.00

NET CHANGE IN AAHUs DUE TO PROJECT	
A. Future With Project Open Water AAHUs =	0.00
B. Future Without Project Open Water AAHUs =	0.75
Net Change (FWP - FWOP) =	-0.75

TOTAL BENEFITS IN AAHUs DUE TO PROJECT	
A. Emergent Marsh Habitat Net AAHUs =	-3.47
B. Open Water Habitat Net AAHUs =	-0.75
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	-2.72

ATTACHMENT 2
FIELD DATA SHEETS

M_Sect1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 9/3/09 Time: _____ Project: Plaquemines non-fed

#1 Site #/lat-lon: 29°46'58.8" 90° 2' 40.2" Name: 6 total 3 on levee 3 at site

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: 80

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure 50

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory : 95 /species lizard tail, smartweed, fern, palmetto, rubus, pennywort, alligatorweed, buttonbush, Boemeria cylindrica

Tree Species in Understory (include height/indicate abundance) ash, red maple

Percent midstory : 40 /species muscadine

Tree Species in Midstory(include height/indicate abundance) am. elm, red maple, sugarberry, sweetgum, cypress, ash, muscadine, tupelo

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. ismeasured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

pumpkin ash	red maple		cypress	comm. elm
1.25	1.9	19.3	40.1	7.1
7.7	8.5	.5	15.2	
12.3 Topped ("Died" at TY30)	3.0	1.0	14.7	
8.9	3.1	1.0 inj.	22.1	
	5.8	5.0 bent	21.6	
	2.7	11.7 inj. ("died" @ TY 30)		
	7.0	2.6		
	4.9	Snag		
	6.0			
	3.6			
	1.3			
	3.8			
	11.6			
	2.1			

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration)– (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: JulyAug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):# 1 /#total snags _____ /#future snags_____

Sweetgum downed but living

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps 300 feet_____

N_Sect1

#1 a

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 19 Aug 09 Time: _____ Project: Plaq. Non-Fed (West)

Site #/lat-lon: 4 pictures Name: _____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):
90° 0' 16.388" W
29° 43' 12.641" N

TREE SPECIES ASSOCIATION:
(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)
Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 100
Percent overstory canopy softmast/edible seed producers: Ø
Percent overstory canopy closure: 20

UNDERSTORY/MIDSTORY:
Percent understory : 95 /species Duck potato, cat tail, alligator weed, pickerel weed, polygonum, marsh mallow
Tree Species in Understory (include height/indicate abundance) none
Percent midstory : 10 /species wax myrtle, bacchris
Tree Species in Midstory (include height/indicate abundance) red maple, cypress, tallow

STAND MATURITY:
(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc): "dried" @ T+30 due to prolonged inundation

AGE: _____ or TREE SPECIES – with D.B.H.

B. Cypress
Plot 1 { 41.1, 27.3, ~~12.3~~, 4.6, 25.2, 16.4

Plot 1 { Maple 3x 1.25, .5, 10.2, 7.8, 8.75, .5, 5.1, 3.9, 3.4, 34.5 } same base

Plot { Sugarberry 3.8

Plot 1 { Tallow 3x 1.7", 4x 1", 2.2

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**)
Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

0_Sect1

#1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 19 Aug 09 Time:_____ Project: Plaq. Non-Fed (West)

Site #/lat-lon: 4 pictures Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

b

90° 0' 16.388" W
29° 43' 12.641" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 100

Percent overstory canopy softmast/edible seed producers: Ø

Percent overstory canopy closure: 20

UNDERSTORY/MIDSTORY:

Percent understory: 95 /species Duck potato, cat tail, alligator weed, pickerel weed, polygonum, marsh mallow

Tree Species in Understory (include height/indicate abundance) none

Percent midstory: 10 /species wax myrtle, baccharis

Tree Species in Midstory (include height/indicate abundance) red maple, cypress, tallow

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

B. Cypress

plot 1 { 4.1"
27.3
~~10.3~~
6.6
25.2
16.4

plot 1 { Maple 3x 1.25
.5
10.2
7.8
8.75
.5
5.1
3.9
3.4
34.5

"dead" @ T430 due to storm damage

} same base

Sugarberry 3.8

plot 1 { Tallow 3x 1.7"
4x 1.1"
2.2

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

R;R

P_Sect 1

#008

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/09 Time: _____ Project: Plaq. Non-Fed (West)

Site #/lat-lon: 29°42'44.5"89°59'57.6 Name: _____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 0 Percent overstory canopy cypress: 10

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure: 30

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory : 100 /species pennywort, delta duck potato, cattail, polygonum, fragrant flat sedge, button bush, tallow o'cherry*

Tree Species in Understory (include height/indicate abundance) Walters millet (short hairs), red maple, cypress, alligator weed, biden, frogfruit, goldenrod

Percent midstory : <5 /species buttonbush, elder berry

Tree Species in Midstory (include height/indicate abundance) willow, red maple, ,

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc): _____

AGE: _____ or TREE SPECIES – with D.B.H.

tupelo	cypress	maple	willow
10.5	12.3	1.5	1
21.7	11.8	1	.5
12	9.4		.5
5.25	16		.1
16			1
11.8			
7			
14.1			
10.4			
8.4			
15.4			
10.25			
13.25			
12.5			

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept) _____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags 2 /#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet none

Q_ Sect 1

ID #1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/09 Time:_____ Project:_____

Site #/lat-lon: 29°42'4.1" 89°59'32.8" Name: Plaquemines Non Fed (west)

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: 45

Percent overstory canopy softmast/edible seed producers: 80

Percent overstory canopy closure: 80

UNDERSTORY/MIDSTORY:

Percent understory : 80 /species trumpet creeper, elephant ear, elderberry spiderwort, lizard tail, false nettle

Tree Species in Understory (include height/indicate abundance)_____

Percent midstory : 55 /species elderberry, privet trumpet creeper

Tree Species in Midstory (include height/indicate abundance) maple, tallow, cypress

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

maple	B. cypress	willow	privet	Tallow
10"	11	11.9	1"	3"
5"	12.2	2.5		
3.5	11.9	10.4		
5.5	14	6.5		
7"	10	8"		
5.3"	12.7			
10.5"	24.5			
6.8" 2.5	14.5			
2" 2.5	2"*			
5.6" 2.5	14.75			
6" 3				
3 5.25				
4.5 (45° angle)				
10.6 10.5				

1.5, 3x1", 1.5", 4.4, 0.3, 3.1, 2.8, 2.5x3, 2.25, .5, 1, 6.1, 1.5, 5.5, 5

"died" @ TY30 due to stormdamage

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags 2 /#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet none

Z1 — sect4

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11-18-2009 Time: 11:30-ish Project Name: Flag Parish NFL - Sect. 4 Subsided Ridge

Field Trip Participants: B. Firmin, L. Behrens, L. Marcy, F. Cole, Albertine

Site # / Name: Subsided Ridge - (1A)

Lat/Long: N 29.59201 W089.89863

3 pictures

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Lots of downed trees, Hydrology altered Dry when we came

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees 30 %

Percent of overstory canopy that consists of soft-mast producing trees 70 %

Percent of overstory canopy that consists of non-mast producing trees 0 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

30% canopy closure

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

box elder 10.6	13", 6.5", 12.4	Tallow 2x1"	
water oak 20"	, 27", 15.6"	" 4x1"	
sweetgum 11"	, 12.5", 18.25", 7.8",	17.5" " 1x2"	
sugarberry 5",	7"	" 2x2"	
		" 2"	
			3 snag
			1 future snag

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 %

Midstory non-tree species: persimmon, Tallow, box elder, palmetto, nuttall oak, muscadine

Midstory tree species:

Percent understory canopy closure: 75 %

Understory non-tree species: black berry, palmetto, tallow

Understory tree species:

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

Variable V4 - Hydrology

Check one:

_____ Class 1	***Highly Altered***	Forced drainage system which efficiently removes water from the surface year round.
_____ Class 2	***Moderately Altered***	Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment
_____ Class 3	***Little to No Alterations***	Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.)

Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

_____	Class 1	0 to 5.0 acres
_____	Class 2	5.1 to 20.0 acres
_____	Class 3	20.1 to 100.0 acres
_____	Class 4	100.1 to 500.0 acres
_____	Class 5	> 500 acres

Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

LAND USE	Weighting Factor	PERCENT OF THE TOTAL AREA
Bottomland hardwoods, other forested areas, marsh habitat, etc.	(1.0)	_____
Abandoned agriculture, overgrown fields, dense cover, etc.	(0.6)	_____
Pasture, hayfields, open water, etc.	(0.4)	_____
Active agriculture	(0.2)	_____
Nonhabitat: linear, residential, commercial, industrial development, etc.	(0.0)	_____

Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

Type Classes

_____ Class 1	Constant / Major (Major highways, industrial, commercial, major navigation.)
_____ Class 2	Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.)
_____ Class 3	Seasonal / Intermittent (Agriculture, aquaculture.)
_____ Class 4	Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.)

Check one:

Distance Classes

_____ Class 1	0 to 50 feet
_____ Class 2	50.1 to 500 feet
_____ Class 3	> 500 feet

Z2 _ Sect4

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: _____ Project Name: Plaq Parish NFL - Sect. 4

Field Trip Participants: same as 1a

Site # / Name: Subsided Ridge - 1B 3 pictures

Lat/Long: N29.59242 W89.89980

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.):
More live oaks than 1a, Baccharis, Trees in poor condition due to hurricane

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees: 50 %

Percent of overstory canopy that consists of soft-mast producing trees: 50 %

Percent of overstory canopy that consists of non-mast producing trees: 0 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

40% canopy closure

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

Water Hickory 20.3	tallow 6 x 1"	maple 8.3	live oak 8.5
	1 x 2"	6.1	16.2
	5 x 1"	6.7	
nuttall oak 21	6 x 1"		
	3.2		
	6 x 1"		
	4 x 1"	Amer. Elm 8"	
		4.3"	
Sugarberry 8.5		13	
			Deciduous Holly 4.3 topped
green Ash 7.1			

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 % Midstory tree species:

Midstory non-tree species: tallow, palmetto, deciduous holly, red maple, baccharis

Percent understory canopy closure: 65 % Understory tree species:

Understory non-tree species: mescabine, tallow, palmetto,

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

Variable V4 - Hydrology

Check one:

_____	Class 1	***Highly Altered***	Forced drainage system which efficiently removes water from the surface year round.
_____	Class 2	***Moderately Altered***	Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment
_____	Class 3	***Little to No Alterations***	Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.)

Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

_____	Class 1	0 to 5.0 acres
_____	Class 2	5.1 to 20.0 acres
_____	Class 3	20.1 to 100.0 acres
_____	Class 4	100.1 to 500.0 acres
_____	Class 5	>500 acres

Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

LAND USE	Weighting Factor	PERCENT OF THE TOTAL AREA
Bottomland hardwoods, other forested areas, marsh habitat, etc.	(1.0)	_____
Abandoned agriculture, overgrown fields, dense cover, etc.	(0.6)	_____
Pasture, hayfields, open water, etc.	(0.4)	_____
Active agriculture	(0.2)	_____
Nonhabitat: linear, residential, commercial, industrial development, etc.	(0.0)	_____

Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

Type Classes

_____	Class 1	Constant / Major (Major highways, industrial, commercial, major navigation.)
_____	Class 2	Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.)
_____	Class 3	Seasonal / Intermittent (Agriculture, aquaculture.)
_____	Class 4	Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.)

Check one:

Distance Classes

_____	Class 1	0 to 50 feet
_____	Class 2	50.1 to 500 feet
_____	Class 3	>500 feet

Z3_ sect4

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: _____ Project Name: Plaq. Parish NFF- Sect.4

Field Trip Participants: Same as 1a&b

Site # / Name: Subsided Ridge - 2A

Lat/Long: N29.59514 W89.90453

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Larger trees in better condition than 1B ; no tallow - one in understory only

Variable V1 - Tree Species Association

3 pictures

Percent of overstory canopy that consists of hard-mast producing trees	35 %	Must add to equal 100%
Percent of overstory canopy that consists of soft-mast producing trees	65 %	
Percent of overstory canopy that consists of non-mast producing trees	0 %	

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

55% canopy closure

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

Water Hickory	Hackberry	Am. Elm	Red Maple
12.25	7.1	12.4	7.3
12	6.6	11.3	2
15.3	12.5	9.25	3.8
20	7.2	12.3	1
	13.8	8.25	3
		10	2.25
live Oak	Sweetgum	7.5	4.5
11	5.5		2.5
13.6	3		
	3	Deciduous	
	11.1	4.7	
	13.7		

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 15 % Midstory tree species:

Midstory non-tree species: Sea. Holly, palmetto, red maple, Sweetgum, Am. elm

Percent understory canopy closure: 50 % Understory tree species:

Understory non-tree species: I-tallow, palmetto

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

Variable V4 - Hydrology

Check one:

_____	Class 1	***Highly Altered***	Forced drainage system which efficiently removes water from the surface year round.
_____	Class 2	***Moderately Altered***	Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment
_____	Class 3	***Little to No Alterations***	Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.)

Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

_____	Class 1	0 to 5.0 acres
_____	Class 2	5.1 to 20.0 acres
_____	Class 3	20.1 to 100.0 acres
_____	Class 4	100.1 to 500.0 acres
_____	Class 5	> 500 acres

Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

LAND USE	Weighting Factor	PERCENT OF THE TOTAL AREA
Bottomland hardwoods, other forested areas, marsh habitat, etc.	(1.0)	_____
Abandoned agriculture, overgrown fields, dense cover, etc.	(0.6)	_____
Pasture, hayfields, open water, etc.	(0.4)	_____
Active agriculture	(0.2)	_____
Nonhabitat: linear, residential, commercial, industrial development, etc.	(0.0)	_____

Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

Type Classes

_____	Class 1	Constant / Major (Major highways, industrial, commercial, major navigation.)
_____	Class 2	Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.)
_____	Class 3	Seasonal / Intermittent (Agriculture, aquaculture.)
_____	Class 4	Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.)

Check one:

Distance Classes

_____	Class 1	0 to 50 feet
_____	Class 2	50.1 to 500 feet
_____	Class 3	> 500 feet

Z4_sect4

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 11/18/09 Time: _____ Project Name: Plaq. Parish NFL - sect. 4

Field Trip Participants: same as 1a & b

Site # / Name: Subsided Ridge - 2B

Lat/Long: N 29.59413 W 89.90325

3 pictures

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Trees in decent condition; more tallow than 2A

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees: 60 %

Percent of overstory canopy that consists of soft-mast producing trees: 40 %

Percent of overstory canopy that consists of non-mast producing trees: 0 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

65% Canopy closure

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

green ash	Tallow	Am Elm	Sweet gum
12"	12x.5	2"	13.7
11.5"	2x1"	12.5	
	20x.5"		
Red Maple	Water oak	Hackberry	
3"	7"	12.6	
12"	24"	12.5	
		21	
			1 snag

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 25 % Midstory tree species: Sweet gum,

Midstory non-tree species: palmetto, red maple, tallow, am. elm, wateroak

Percent understory canopy closure: 50 % Understory tree species:

Understory non-tree species: tallow, palmetto

*****NOTE: **NONE OF THE FOLLOWING VARIABLES (I.E., V4, V5, V6, V7) NEED TO BE DETERMINED IN THE FIELD*****
THEY CAN BE DETERMINED IN THE OFFICE USING MAPS AND OTHER PERTINENT INFORMATION

Variable V4 - Hydrology

Check one:

_____	Class 1	***Highly Altered***	Forced drainage system which efficiently removes water from the surface year round.
_____	Class 2	***Moderately Altered***	Water table lowered relative to ground level so as to significantly reduce periods of inundation, or water table raised so as to cause extended inundation or impoundment
_____	Class 3	***Little to No Alterations***	Hydrology essentially unaltered. (The area could contain small levees and/or canals, provided that the water regime has not been significantly altered.)

Variable V5 - Size of Contiguous Forested Area

Corridors less than 75 feet wide do not constitute a break in the forested area contiguity.

Check one:

_____	Class 1	0 to 5.0 acres
_____	Class 2	5.1 to 20.0 acres
_____	Class 3	20.1 to 100.0 acres
_____	Class 4	100.1 to 500.0 acres
_____	Class 5	>500 acres

Variable V6 - Suitability and Traversability of Surrounding Land Uses

Within a 1/2-mile of the perimeter of the site, determine the percent of the surrounding area that is occupied by each of the following land uses. The sum of those values must equal 100%.

Check one:

LAND USE	Weighting Factor	PERCENT OF THE TOTAL AREA
Bottomland hardwoods, other forested areas, marsh habitat, etc.	(1.0)	_____
Abandoned agriculture, overgrown fields, dense cover, etc.	(0.6)	_____
Pasture, hayfields, open water, etc.	(0.4)	_____
Active agriculture	(0.2)	_____
Nonhabitat: linear, residential, commercial, industrial development, etc.	(0.0)	_____

Variable V7 - Disturbance

The effect of disturbance is a factor of the distance to, and the type of, disturbance.

Check one:

Type Classes

_____	Class 1	Constant / Major (Major highways, industrial, commercial, major navigation.)
_____	Class 2	Frequent / Moderate (Residential development, moderately used roads, waterways commonly used by small to mid-sized boats.)
_____	Class 3	Seasonal / Intermittent (Agriculture, aquaculture.)
_____	Class 4	Insignificant (Lightly used roads and waterways, individual homes, levees, ROWs.)

Check one:

Distance Classes

_____	Class 1	0 to 50 feet
_____	Class 2	50.1 to 500 feet
_____	Class 3	>500 feet

V_Sect2

Plaq. Non-Fed (west)

#005

N 29°37'16.1"
W 089°57'13.0"

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project:

Date: Thurs., Aug. 13, 2009

Marsh Acreage:

Section 2
Myrtle Grove pump station

Wetland Type: floodside marsh

Water Acreage:

Land Loss Rate:

Total Acreage:

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		None				
FWOP	1						
FWP	1						

Saline? (Brackish)

D: dominant

D Distichlis spicata
D: Spartina patens
SD: " alterniflora
Bacopa cabana
D: Scirpus (robustus)
Iva frutescens
Baccharis

no SAV seen

90° 0' 33.831" W
29° 43' 28.795" N

#2

W_Sect1

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

2 pictures

Project: P bayu. Non Fed

Date: 8/19/09

Marsh Acreage:

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

Fresh Marsh

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		none		100%		
FWOP	1						
FWP	1						

walter's millet
cypress - alligator weed
coffeeweed - cyperus
duckweed - amaranth
ragweed - buttonbush
hybiscus - cattail
salvinia

90° 1' 5.826" W
29° 44' 0.665" N

X_Sect1

5 pictures - 1 of pickerel weed

#3

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: Plaquemines Non Fed

Date: 8/19/09

Wetland Type:

Land Loss Rate:

Marsh Acreage:

Water Acreage:

Total Acreage:

25% forested

Ash 2.2

maple
3.4
1.5 5 } same base
1.75 3
1 2 } same base
1 3
.5 2 } same base
1.2 1.7
1.4

Same base

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		None		100%		
FWOP	1						
FWP	1						

elephant ear
pickerel weed
poligonum
fresh rush
duck potato
deer pea
Salt bush
Coffee weed
alligator weed
Penny wort
marsh mallow
button bush
Salvinia
lizard tail
duckweed
beaked rush

A_Sect5

Class 5 Floodside

pt #3

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time:_____ Project: Plaquemines Non Fed (Westbank)

Site #/lat-lon: 29°33'5.1" 89°47'18.2" Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 100% Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 0

Percent overstory canopy closure: 30% (estimated by DOQQ imagery & live oak tree sizes)

UNDERSTORY/MIDSTORY:

Percent understory : 5" /species goldenrod, smartweed, bacchus, bacopa

Tree Species in Understory (include height/indicate abundance) none

Percent midstory : 99 /species Bacchus, wax myrtle, tallow, palmetto

Tree Species in Midstory (include height/indicate abundance) tallow, oak

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

live oak	✓11"	1 base
"	✓14"	
"	✓14"	
"	✓7.8"	
"	2" ✓	
Tallow	3.1" ✓	
"	2" ✓	
"	4.3 ✓	
"	2" ✓	
"	2" ✓	
"	1.8" ✓	
"	3 ✓	
"	4.8" ✓	
"	3" ✓	

Yaupon 2.3 — Not used in dbh calculations; shrub species

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____ /#total snags _____ /#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet_____

#32?

B_Sect5

class 5 Floodside

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 11 Aug 09 Time: _____ Project: Plaquemine Non-Fed (Westbank)

Site #/lat-lon: 29°33'26.7" 89°47'19.4" Name: _____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 95% Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: Ø

Percent overstory canopy closure: 75

UNDERSTORY/MIDSTORY:

Percent understory : 5 /species poison ivy, smartweed, poliggonum

Tree Species in Understory (include height/indicate abundance) Tallow, oak

Percent midstory : 65 /species Baccharis, ~~tallow~~, wax myrtle, palmetto

Tree Species in Midstory (include height/indicate abundance) Tallow, oak

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

Live oak 13" ✓
Tallow 2" ✓
Live oak 18" ✓
Tallow 2" ✓
Live oak 13" ✓
" 9.5" ✓
" 9" ✓
" ✓ 21.2"
" ✓ 8"
" ✓ 8.5"
" 4.5" ✓
" ✓ 6.5"
Tallow 1.2" ✓
" 2.2" ✓

same base

Tallow 3.5 ✓
" 4.5 ✓

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

pt. #30

D-Sect5

class5 Floodside

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time:_____ Project: Plaquemines Non-Fed (Westbank)

NAD83

Site #/lat-lon: N 29°32'55.2" W089°41'.2" Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 100% Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 0

Percent overstory canopy closure: 5%

UNDERSTORY/MIDSTORY:

Percent understory : 15 /species Bacchus & Goldenrod, waterhyacinth

Tree Species in Understory (include height/indicate abundance)_____

Percent midstory : 90 /species Bacchus

Tree Species in Midstory (include height/indicate abundance) Ø

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):_____

AGE: _____ or TREE SPECIES – with D.B.H.

✓25.3" live oak edge of plot

* Anticipate Chinese tallow encroachment from nearby areas by T120 & T450.

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

E_Sect3

Class 5 Floodside

Section 3

#35

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/11/09 Time: _____ Project: Plaq. Non Fed (Westbank)

Site #/lat-lon: 29°37'3.2" 89°55'4.6" Name: _____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

measured on the 1/2 plot

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 20 Percent overstory canopy cypress: 0

Percent overstory canopy softmast/edible seed producers: 30

Percent overstory canopy closure: 55

UNDERSTORY/MIDSTORY:

Percent understory : 40 /species poison ivy, peppervine, sedge, button bush, greenbriar, bacchris, goldenrod, marsh mellow

Tree Species in Understory (include height/indicate abundance) water oak, red maple, tallow, elm

Percent midstory : 75 /species buttonbush, bacchris

Tree Species in Midstory (include height/indicate abundance) Tallow, red maple, live oak, water oak

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc): _____

AGE: _____ or TREE SPECIES – with D.B.H.

Tallow: 2", 1.5", 1.5", 1.5", 2.5", 1.8", 1.6", 1.5", 1.5", 1.5", 3.3", 1.6"

loss of 4 tallow trees @TY20 due to over crowding

water oak: 9", 3"

Red Maple: 4", 4", 6", 4.9 } same base

P Ash 18"

"pt" to storm damage @TY20

Sugarberry: 3, 3, 7.8 } same base

Yaupon: 3", 2", 2" — Not used in dbh calculations; shrub species

Live oak: 4.5

American elm in 1/2 not measured

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

I_Sect1

Floodside
Class 2

#4

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 9-3-09 Time: _____ Project: 3 pictures

Site #/lat-lon: 29° 46' 18.1" 90° 2' 57.4" Name: Plaquemines Un. Fed

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 95

Percent overstory canopy closure: 40

UNDERSTORY/MIDSTORY:

Percent understory: 95 /species heartleaf pepper vine, alligatorweed, hydrocotile, button bush, smartweed, lizard tail, rubus, palmetto, goldenrod, I. shrum, spider wort

Tree Species in Understory (include height/indicate abundance)

green ash, tallow, elm, red maple

Percent midstory: 45 /species poison ivy, button bush 2x.5, baccharis, privet

abundant

Tree Species in Midstory (include height/indicate abundance)

tallow, red maple, green ash, elm, willow

STAND MATURITY:

(**Age or d.b.h. can be used.** Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

9r Ash	b. willow		Am elm	maple
16"	1.9		.5	4.7
1.	3.7		1.7	5.5
.5	dead		.5	3.8
8.5	4.1		.5	2.5
7.	10.6		.5	3.2
.5	7.5	Tallow	.25	5.2
8	7.4	3.1	1	.5
10	6.9			7.4
9.8			2.3	5.9
5.4			4.1	1.6
		2.25	1.25	.5
live oak		2.25	3x.5	2.8
9.4	.5	2x.5	1.25	1.5
	.25	.5	2	7.6
	2x.5	3.2	7	
		2		

laying down but alive "died" by TY20

"died" by TY20

"died" by TY20 in 1990

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags 5

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

#34

C_Sect5

class5

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 11Aug09 Time:_____ Project: 2 Plaquemine Non-Fed (West)

Site #/lat-lon: 29°34'56" 89°48'5.8" Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 35 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 20

Percent overstory canopy closure: 60

UNDERSTORY/MIDSTORY:

Percent understory : 10 /species heartleaf peppervine, rubus, dewberry millcured, sedge

Tree Species in Understory (include height/indicate abundance) live oak, tallow, sugarberry

Percent midstory : 30 /species rubus, bacchrus

Tree Species in Midstory (include height/indicate abundance) tallow, live oak

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

Sugarberry	live oak	Tallow
✓17.5	✓17"	✓4.8
	✓18"	✓6"
	✓3.75"	✓2.6
	✓14.5"	✓3.4
	✓9"	
	✓17"	
	✓6"	
	✓2.1	
	✓8.25"	
	✓2.75"	

all same base

water oak
✓1.3

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

F_Sect1

Class 5

Section 1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

#6

Date: 8/19/09 Time:_____ Project: 1 picture

Site #/lat-lon:_____ Name: Plaquemines Non Fed

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 2' 33.681" W
29° 45' 59.18" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 35 Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 65

Percent overstory canopy closure: 70

UNDERSTORY/MIDSTORY:

Percent understory : 25 /species rubus, pepper vine, fern, virginia creeper, privet, ladies eyelashes

Tree Species in Understory (include height/indicate abundance) tallow, red maple, persimmon, elm, box elder, am. elm

Percent midstory : 75 /species virginia creeper, poison ivy, privet, rubus

Tree Species in Midstory (include height/indicate abundance) persimmon, red maple, tallow, water oak, live oak, box elder, am. elm.

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

persimmon	hawthorn	live oak /	water oak	Box elder
.5 ✓	✓ 2	✓ 3.4	✓ 7.5	✓ 4 7 ✓
	✓ 2x.5	✓ .5	✓ 5.75	✓ 1.4
	✓ 1.5	✓ 1.5	✓ 2.5 ✓ 2.75	✓ 2.7 8.3 ✓
Tallow		✓ 6.8	✓ 10 ✓ .5	✓ 2 3.5 ✓
.5 ✓			✓ 11.5	✓ 5.5
			✓ 3.5 ✓ 2.25	✓ 4.2
			✓ 2.75	✓ 3.3
				✓ 2.25
		green ash		
Sugar berry	dogwood	✓ 2"	red maple	
3" ✓	✓ .5	✓ 22	✓ 21" injured	← "died" @ TY20
1" ✓	✓ 2"		✓ 2"	

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet_____

G_ Sect1

Class 2

#2

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 9/3/09 Time:_____ Project: Plaque Non Fed

Site #/lat-lon: 29° 47' 0.8" 90° 2' 32.6" Name: 3 pictures

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

whole plot

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 10 Percent overstory canopy cypress: 5

Percent overstory canopy softmast/edible seed producers: 90

Percent overstory canopy closure 70

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory : 50 /species rubus, palmetto virginia creeper bromelius cylindrica pepper vine, smart weed, poison ivy, caphon weed, spiderwort

Tree Species in Understory (include height/indicate abundance)

Sweet gum, ash, red maple, am. elm, tallow

Percent midstory : 50 /species

Tree Species in Midstory(include height/indicate abundance)

Redmaple, Sweet gum, box elder, persimmon, ash, american elm

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. ismeasured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

water oak	red maple	Sweet gum	box elder
✓14.3	✓11.7	✓2x1"	1.8 ✓
	✓4.5	✓.5 13.8✓	1.75✓
	✓2.8	✓5x.5 2✓	1" ✓
Cypress	✓3.7	✓1.25 3x1"✓	.5✓
✓33.2	✓3.1	✓1.9 4x.75"✓	1.5✓
	3.3✓	✓2.6 32.6✓	1✓
persimmon	3.2✓	✓2x.5 3x1"✓	1"✓
✓2x.5		✓25.2 1.5"✓	7.4✓
		✓.5 2"✓	4.8✓
american elm		✓1.25 1.5"✓	1.5✓
✓14.7		✓1.5 2x.25✓	5.1✓
		✓.5	3.3✓
gr. Ash		✓2x.75	5.7✓
✓15.7		✓3x1	
		✓26.4	

"died" @ TY20 - storm loss

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration)– (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: JulyAug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):# 1 /#total snags _____ /#future snags 2

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet_____

H_Sect2

class 2

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/13/09 Time: _____ Project: Plaquemines Non Federal

#02

Site #/lat-lon: 29°40'46.2" 89°59'15.2" Name: _____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: 10

Percent overstory canopy softmast/edible seed producers: 80

Percent overstory canopy closure 40

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory : 20 /species ironweed, poliganeum, ladys earchopse lizard tail, rubus

Tree Species in Understory (include height/indicate abundance)

elm tallow, maple (≈12), persimmon

Percent midstory : 40 /species

Tree Species in Midstory(include height/indicate abundance)

tallow, persimmon, sugarberry, maple

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. ismeasured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

American Elm		bither pecan	tallow	maple
✓5.7		9.5	.5" ✓	✓3.5" 3.5✓
	✓2x1.25	✓1"	.5" ⊗	✓3.25" 20.4✓
	✓6x.75"	✓2x3/4"	6x.75"✓ 1.5"✓	✓7.5 6.1✓
B. Cypress	✓5x1"	✓2x.5"	5x.75"✓ 2"✓	✓7.2 8"✓
✓20.1	✓3x.5"	✓1"	1"✓ 3"✓	✓2.7 14.5✓
✓18.5 ✓26.5	✓6x.5"	✓1.75"	✓1.25" .75 ⊗	
	✓2.2	✓2x.75"	.75⊗ 2x.5⊗	pumpkin Ash
Sugar berry	✓.5"	✓1"	✓1" 2x2.25✓	13.6✓
✓5 ✓5.6 > Same base		2x1.5"✓	✓3.5" 1.25✓	
✓7.1	✓12x.5	.5"✓	✓1.5" 1"✓	Persimmon
✓3.5	2x1.25✓ ✓7x.5"	8x.5"✓	⊗4x.75" 1"✓	⊗.5" .5" ⊗
✓3.3	4x.5✓ ✓9"	2x1.25"✓	✓2x1" 1.75"✓	Sweetgum
✓8.5	✓6x1.5"	3x1"✓	⊗6x.75" 1.25✓	15.5✓
✓7.6	✓2"	5x.5"✓	✓2"	
	✓.5"	3x.5"✓		

died @ 1920

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration)– (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: JulyAug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

J_ Sect1

Section I N of Ollie Pump

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/19 Time: 1500 Project: Play NFL

#4

Site #/lat-lon: 2 pectines Name:

Class 2

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):
90° 2' 28.812" W
29° 46' 2.216" N

TREE SPECIES ASSOCIATION:
(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)
(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)
Percent overstory canopy hardmast: 5 Percent overstory canopy cypress: Ø
Percent overstory canopy softmast/edible seed producers: 95
Percent overstory canopy closure: 50

UNDERSTORY/MIDSTORY:
Percent understory : 80 /species pepperwine, spiderwort, rubus, poison ivy, trumpet creeper, elderberry
Tree Species in Understory (include height/indicate abundance) sugarberry, green ash
Percent midstory : 60 /species privet, elderberry
Tree Species in Midstory (include height/indicate abundance) persimmon, american elm, box elder, willow, mullah oak & red maple, sugarberry, roughleaf dogwood

STAND MATURITY:
(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

"died" to storm damage @ TY20

"died" @TY20

Box Elder 7, 5.5, 12 (Damaged) 3, 8.7, 2, D 3, 1, 2, 1, 1.2, 1.5, D=Damaged 3, 5, 3, 2
Sugar berry 6, 7
Red Oak 3, 3, 8, 4, 20
Dogwood 1, 1, 1, 1, 1.9, 1
Persimon 2, 2, 1.5
Red Maple 10, .5, 1.3, 19.2, 7.5, 1, (1.5 + .5)
~~Tupelo 17.7~~
Green Ash 17.2, 17.7
China Berry 1.5
Water Oak 1.8,
Am. Elm 3.1

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet_____

K_Sect1

class 1

#5

2 pictures

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date: 8/19/09 Time:_____ Project: Plaq non fed

Site #/lat-lon:_____ Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

90° 2' 32.338" W
29° 45' 59.291" N

TREE SPECIES ASSOCIATION:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure: 60

UNDERSTORY/MIDSTORY:

Percent understory : 75 /species pepperwine, ladies eardrops, tie vine, lizard tail, poligonum, poison ivy, spiderwort

Tree Species in Understory (include height/indicate abundance) tallow, elm, red maple

Percent midstory : 60 /species French mulberry

Tree Species in Midstory (include height/indicate abundance) tallow, redmaple, Am elm

STAND MATURITY:

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stand's overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H.

tallow		maple	green ash	Am. elm	Rd oak
⊛ 2x.5	1✓	6.25✓	✓15"	✓2"	✓5.7 bent over (died" to storm damage @TY20)
✓1"	.75⊛	10.5✓	✓81	✓2.5	
✓1.5"	.5⊛	2x 1✓	✓8		
✓1	2.5✓	1.2✓ loss @TY20 overcrowding	✓10		box elder
✓4.75	.5⊛	✓1.5	✓12		1" ✓
✓1.3	2.5✓	✓2 same base	✓22		2x1" ✓
✓3 loss to overcrowding @TY20	same base	✓4.1	same ✓10.6		
✓3		✓1.5	base ✓17		
✓1	.3✓	6.7✓ loss @TY20 overcrowding	✓20 (topped & debranced)		
⊛ 4x.5	1.5✓	8.3✓			
✓2.25	.5⊛	7.3✓			
✓1	.3✓	✓4.6 (topped) ← "died" to storm damage @TY20			
✓3	2✓				
✓1.75	4.5✓	✓8.5	2.25✓		
✓3.25	✓1.5	✓5.7	4.5✓		

HYDROLOGY (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered; stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____ feet_____

L_Sect2

class 1

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

#004

Date: 8/12/09 Time:_____ Project: Plaquemines Non-Fed (wet)

Site #/lat-lon: 29°40'44.1" 89°58'55.2" Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast: Ø Percent overstory canopy cypress: Ø

Percent overstory canopy softmast/edible seed producers: 100

Percent overstory canopy closure 60

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory : 40 /species privet, poison Ivy, peppervine, muscadine, rubus, Virginia creeper

Tree Species in Understory (include height/indicate abundance) boxelder, dogwood, hickory, sweetgum, red maple

Percent midstory : 60 /species privet, muscadine, wax myrtle, ~~dogwood~~, sweetgum, ~~water oak~~, ~~? oak~~

Tree Species in Midstory (include height/indicate abundance) dogwood, sweetgum, water oak, ? oak, boxelder

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):

AGE: _____ or TREE SPECIES – with D.B.H. decid. Holly 5.1

17.5	Sweetgum				dogwood		boxelder		.5 ⊗
8.2	✓3"	14✓			.5 ⊗	.25✓	⊗ .5	11✓	
.5	✓12.5	✓1.8	✓4.75		✓1"	✓1 1.5✓	⊗ .5	8.5✓	
.5	✓16.7	17✓	.5 ⊗	⊗ .75	✓3"	✓.25 .75 ⊗	✓1.3	4✓	
	privet			⊗ .5	✓1.5"	✓1 ✓2.75	✓3.5		
	.75	.5		✓1	.5 ⊗	✓2" .5 ⊗	✓3.5	14.1✓	
8x.5	.5	1.5		✓.5	✓1"	⊗ .5 3.5✓			
	.5	1		✓2.5	✓1.8"	⊗ .5 1.5✓			
	.5			✓2	✓3.3	✓2.25 2✓	water oak		
				✓2	✓3.7	✓.5 1.5✓	✓1.25	.5 ⊗	
	wax myrtle			⊗ .5	.5 ⊗	✓2x 1" 3✓	✓1	.5 ⊗	
	✓5	.5 ⊗		✓2	2x .75 ⊗	⊗ .5" 1✓	.5 ⊗	.5 ⊗	
	.5 ⊗				3x .5 ⊗	⊗ .5 .25✓	✓1.5	.5 ⊗	
				⊗ 2x.5	1✓	✓1"	✓.25	.75 ⊗	
? Oak	1"✓	⊗ 2x.5		✓3 3✓	✓4 .5 ⊗	✓1" 2"✓	✓1.4		

privet not used as shrub species only

Cherry bark

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class3 (minor alteration)– (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: Plaquemine Non Fed (west)

2 sample sites

Date: 11 Aug 09

Marsh Acreage:

Wetland Type:

Water Acreage:

Land Loss Rate:

Total Acreage:

(T_Sect4)

89°51'27.47
29°34'49.83

Reach 4 Seed pumpstation (pt delete)

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	site of Sol. 1, 0 local	5% Marsh 90	0		100	0	0
FWOP	site of Mon Sta. 1 1 local	99	0		100	0	0
FWP	1						

Pontederia Rosetta, Fatsia Papyrus predominate

Same but other forbs on site

89°51'21.19
29°34'47.73
(S_Sect4)

R_Sect2

Wet pasture w/swale

Plaq. Non-Fed (West)

29°41'45.8"
89°59'54.5"

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

#003

Project:

Date: 8/13/09

Wetland Type:

Land Loss Rate:

Marsh Acreage:

Water Acreage:

Total Acreage:

Eddlebuss
~~hydrocotyle~~
bermuda grass
polygonum
Camphor weed
marsh mallow
eleocharis
Soft rush
rubus
water primrose
alligator weed

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0	95			Ø		
FWOP	1						
FWP	1						

Trimble Pt #1

Phragmites
Spartina paten
Sesbania (rattlebo
Camphorata
Bulltongue
Cattail
Three-square
Baccharis
Spartina alterniflo
Scirpus

Flood side

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed – St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - intermediate

Water Acreage:

Land Loss Rate:

Total Acreage:

Mainmade Channel along W edge

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		0	class 1	15%	1.8	1
FWOP	1						
FWP	1						

Trimble Pt #2

Protected side

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-17-10 Time: _____ Project Name: NOV Fed – St. Jude to Venice

Field Trip Participants: _____

Site # / Name: _____

Lat/Long: _____

[Scrub-Shrub]

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Tallest trees ~8ft; no real overstory canopy; trees currently midstory

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees	0	%
Percent of overstory canopy that consists of soft-mast producing trees	20	%
Percent of overstory canopy that consists of non-mast producing trees	80	%

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

Tallow			
Sugarberry			
Dogwood			
Elderberry			

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 40 % Midstory tree species: Tallow, Sugarberry, Dogwood, elderberry; Brazilian berbend,

Midstory non-tree species:

Percent understory canopy closure: 100 % Understory tree species: Goldenrod; Curly Dock; Blackberry

Understory non-tree species: frogbit; trifolium

Transverse Pt #3

Flood side

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-17-10 Time: _____ Project Name: NOV Fed - St. Jude to Venice

Field Trip Participants: _____

Site # / Name: _____

Lat/Long: _____

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Spoil Bank on edge of Impact shapefile; floodside; Hardwood species

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees	0 %	Must add to equal 100%
Percent of overstory canopy that consists of soft-mast producing trees	75 %	
Percent of overstory canopy that consists of non-mast producing trees	25 %	

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

	Persimmon	Tallow	Sugarberry	Mulberry
	2.0×3	5.3	2.5	1.2
1.9	1.9×2	2.8 (same base)	2.4	0.8 (same base)
2.0	2.2×2	8.7	2.8	2.2
1.8	1.0×2	2.4	1.0	0.9
1.5	1.2×3	1.0 (same base)	2.1	
1.5	0.7×2	6.2	1.1×2	
1.6	1.1×2	8.1	1.8	
1.7	1.6×3	7.6	2.8 (same base)	
1.2	1.0×3 (1.7 same base)	2.5 (from fallen tree)	1.7	
1.5	2.6×2 (0.8 same base)	2.6	2.2	
1.2	1.4	6.5	1.7	
	1.2×3	1.7	leaning - 10.8	
	1.3×2	3.7	1.5 (same base)	
	2.4	2.8 (same base)	1.5	
	1.7×3	1.9	0.7	
	1.1×2	3.5 (same base)		
	1.3×2	2.7		
	1.3	1.8		
	1.0 (same base)	7.6		
	1.1			

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 30 % Midstory tree species: Persimmon, Sugarberry

Midstory non-tree species:

Percent understory canopy closure: 85 % Understory tree species: Persimmon; blackberry; Solidago; poison ivy

Understory non-tree species:

Trimble Pt #4

Flood side

Three-square
Distichlis
Spartina patens
Spartina alterniflora

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed – St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh – Intermediate

Water Acreage:

Land Loss Rate:

Total Acreage:

Solid thick marsh

Rails calling in background

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		0	class 1	100%	2.4 ↓ 4.3	None
FWOP	1						
FWP	1						

Trimble
Pt #5

Floodside

check tides for today
at Noon-time

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed - St. Jude to Venice

Date: 5-17-10

Wetland Type: Marsh - intermediate

Land Loss Rate:

Marsh Acreage:

Water Acreage:

Total Acreage:

Baccharis
Distichlus
sp. patens
sp. alterniflora
Eliocharis
Foxtail on edge

Pigweed
Soft Rush

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		0	class 2	100 %	3.1	1
FWOP	1						
FWP	1						

Trimble
Pt #6

Floodside

Sp. alterniflora
Iva frutens
Sp. patens
Tallow (edge)
Goldenrod (edge)

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed Levee – St. Jude to Venice

Date: 5-17-10 Marsh Acreage:

Wetland Type: Marsh – Brackish Water Acreage:

Land Loss Rate: Total Acreage:

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		0	2	10%	6.2 6.0	1
FWOP	1						
FWP	1						

Trimble Pt #7

Flood Side

Sp. alterniflora
Sp. patens
Iva frutescens

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed levee - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - Brackish

Water Acreage:

Land Loss Rate:

Total Acreage:

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		5%	4	5%	7.5	1
FWOP	1						
FWP	1						

Trimble Pt #8

Flood side

Scirpus martim
Sp. patens
sp. alterniflora
Distichlus
Frogbit
Baccharis
Goldenrod
Johnson grass

Coastal Wetlands Planning, Protection and Restoration Act
Wetland Value Assessment Worksheet

Project: NOV Fed levee - St. Jude to Venice

Date: 5-17-10

Marsh Acreage:

Wetland Type: Marsh - Brackish

Water Acreage:

Land Loss Rate:

Total Acreage:

	Target Year	V1 % Marsh	V2 % SAV	V3 Marsh Edge	V4 Water<=1.5 ft	V5 Salinity	V6 Fish Access
	0		5%	4	10%	8.3	1
FWOP	1						
FWP	1						

Transect Pt. #9

East Bank Protected Side

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: 5-18-10 Time: 11:00 AM Project Name: NOV Phoenix to Bohemia - Reach C

Field Trip Participants:

Site # / Name: The cross-levee

Lat/Long:

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): Large patch of BLH on S side of cross levee

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees: 60 %

Percent of overstory canopy that consists of soft-mast producing trees: 35 %

Percent of overstory canopy that consists of non-mast producing trees: 5 %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

Sugarberry		Black willow	Dogwood	Bitter pecan
13.4	4.50	14.4 (topped)	2.2	1.7
5.8	2.8	12.5 (topped)	1.4	5.6
9.0	2.2	11.3 (topped)	1.7	4.8
3.5	5.3		2.4	
10.4	12.1		2.4	
5.0	3.3	Water oak	2.5	
6.0	5.5	16.2	1.4	
5.1	1.5	11.8	2.0	
2.2	1.7	20.9		
4.2	4.0			
3.2	11.2			
10.4	4.8			
7.2	12.0			
4.2	6.4			
3.7	6.1			
7.8	16.1			
9.9	5.1			

Variable V3 - Understory / Midstory

Percent midstory canopy closure: 20 %

Midstory tree species: Decid. holly, Artimesia, dogwood

Midstory non-tree species: Sugarberry, tallow

Percent understory canopy closure: 80 %

Understory tree species: poison ivy, peppervine,

Understory non-tree species: cherbyl, Carex

WVA Data Sheet for BOTTOMLAND HARDWOODS

Date: _____ Time: _____ Project Name: _____

Field Trip Participants: _____

Site # / Name: _____

Lat/Long: _____

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): _____

Variable V1 - Tree Species Association

Percent of overstory canopy that consists of hard-mast producing trees _____ %

Percent of overstory canopy that consists of soft-mast producing trees _____ %

Percent of overstory canopy that consists of non-mast producing trees _____ %

Must add to equal 100%

Class 1: < 25% of canopy consists of mast producing trees
Class 2: 25% - 50% of canopy consists of mast producing trees, but hard mast producers are < 10% of the canopy
Class 3: 25% - 50% of canopy consists of mast producing trees, and hard mast producers are >10% of the canopy
Class 4: > 50% of canopy consists of mast producing trees, but hard mast producers are < 20% of the canopy
Class 5: > 50% of canopy consists of mast producing trees, and hard mast producers are > 20% of the canopy

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory.

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections)

Variable V3 - Understory / Midstory

Percent midstory canopy closure: _____ % Midstory tree species: _____

Midstory non-tree species: _____

Percent understory canopy closure: _____ % Understory tree species: _____

Understory non-tree species: _____

WVA Data Sheet for SWAMP

To be classified as swamp, the area must have ≥ 33% canopy coverage, and ≥ 60% of the canopy must be comprised of baldcypress, water tupelo, button-bush, planer-tree (water elm), swamp privet, and/or Drummond red maple.

Date: _____ Time: _____ Project Name: _____

Field Trip Participants: _____

Site # / Name: _____

Lat/Long: _____

General Habitat Description (topography, hydrology, disturbance, adjacent land uses, etc.): _____

Variable V1 - Stand Structure

Each component of stand structure should be viewed independently to determine the percent closure or coverage.

Percent overstory canopy closure: _____ % Overstory species: _____

Overstory species: _____

Percent midstory canopy closure: _____ % Midstory tree species: _____

Midstory non-tree species: _____

Percent understory canopy closure: _____ % Understory tree species: _____

Understory non-tree species: _____

Variable V2 - Stand Maturity

Average age of canopy-dominant and canopy-codominant trees. Canopy-dominant and canopy-codominant trees are those trees whose crown rises above, or is an integral part of, the stand's overstory. When both baldcypress and tupelogum (and other species) are present in the overstory, the average age should be weighted according to the percent canopy coverage for each species group. For trees with buttress swell, DBH is the diameter measured at 12" above the swell. In baldcypress and tupelogum, this can sometimes be as high as 10 to 12 feet above the ground.

Percent of overstory closure attributed to baldcypress: _____ %

Average DBH of baldcypress: _____

Percent of overstory closure attributed to water tupelo and other species: _____ %

Average DBH of water tupelo and other species: _____

Must add to equal 100%

Record tree species and DBHs (for current average DBH calculations, and future DBH/tree-growth projections):

WVA/HES Data Sheet BOTTOMLAND HARDWOODS/SWAMP

Date:_____ Time:_____ Project:_____

Site #/lat-lon:_____Name:_____

DESCRIPTION/COMMENTS (including topography, evidence of hydrology, disturbance, adjacent land uses):

_____

_____

_____

_____

TREE SPECIES ASSOCIATION VARIABLE 1:

(Non-mast/inedible seed producers: eastern cottonwood, black willow, American sycamore, Chinese tallow)

(Swamp must have ≥ 33 % canopy cover & ≥ 60 %cypress, tupelo, button bush, planer tree, red maple, present)

Percent overstory canopy hardmast:_____ Percent overstory canopy cypress:_____

Percent overstory canopy softmast/edible seed producers:_____

Percent overstory canopy closure _____

UNDERSTORY/MIDSTORY (VARIABLE 3 (1)):

Percent understory :_____/species_____

_____

Tree Species in Understory (include height/indicate abundance)_____

_____

Percent midstory :_____/species_____

_____

Tree Species in Midstory(include height/indicate abundance)_____

_____

_____

STAND MATURITY (VARIABLE 2):

(**Age or d.b.h. can be used**. Canopy-dominant and co-dominant are those trees whose crowns rises above or is an integral part of the stands overstory. For trees with buttress swell d.b.h. is measured at 12" above the swell for WVA and 18" for HES) **Comments**-(stand conditions, etc):_____

_____

AGE: _____ or TREE SPECIES – with D.B.H.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

HYDROLOGY (VARIABLE 4) (BLH)—Class: 1(Forced/Highly altered) Class 2 (Altered) Class 3 (minor alteration) – (**Swamp**) Class 1(Forced/Highly altered) Class 2 (Altered, stagnant-impounded w/no exchange or minor surface flooding) Class 3 (permanently flooded w/no exchange) Class 4 (minor alterations) (**Percent of flooding**) Percent of area flooded during growing season (indicate approximate end of flooding: July-Aug-Sept)_____

NUMBER OF SNAGS (≥8' and ≥6" dbh):#_____/#total snags _____/#future snags_____

HARDMAST PROXIMITY from site (# of species of oak/pecan & distance) #sps____feet_____

ATTACHMENT 3
DBH SPREADSHEETS

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Name: Plaq Parish NFL - BLH, flood side only

Correction Factor (see below): [ ] for : species

			TY 0		TY 1	5.0		10.0		TY 20		30.0
DBH	Range	#of Trees	Measured DBH	BA	DBH	DBH	BA	DBH	BA	DBH	BA	DBH
6	6.4	3	6.0	0.59	6.3	7.4	0.90	9.0	1.33	12.0	2.36	15.0
6.5	6.9	2	6.9	0.51	7.1	8.3	0.74	9.9	1.06	12.9	1.80	15.9
7	7.4	4	7.2	1.13	7.5	8.6	1.61	10.2	2.27	13.2	3.80	16.2
7.5	7.9	5	7.7	1.62	8.0	9.1	2.26	10.7	3.12	13.7	5.12	16.7
8	8.4	2	8.0	0.70	8.3	9.4	0.96	11.0	1.32	14.0	2.14	17.0
8.5	8.9	2	8.5	0.79	8.8	9.9	1.07	11.5	1.44	14.5	2.29	17.5
9	9.4	4	9.1	1.81	9.4	10.5	2.41	12.1	3.19	15.1	4.97	18.1
9.5	9.9	2	9.7	1.02	9.9	11.1	1.33	12.7	1.75	15.7	2.67	18.7
10	10.4	1	10.0	0.55	10.3	11.4	0.71	13.0	0.92	16.0	1.40	19.0
10.5	10.9	1	10.6	0.61	10.9	12.0	0.79	13.6	1.01	16.6	1.50	19.6
11	11.4	2	11.2	1.36	11.4	12.6	1.72	14.2	2.18	17.2	3.21	20.2
11.5	11.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
12	12.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
12.5	12.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
13	13.4	1	13.0	0.92	13.3	14.4	1.13	16.0	1.40	19.0	1.97	22.0
13.5	13.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
14	14.4	2	14.0	2.14	14.3	15.4	2.59	17.0	3.15	20.0	4.36	23.0
14.5	14.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
15	15.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
15.5	15.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
16	16.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
16.5	16.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
17	17.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
17.5	17.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
18	18.4	3	18.0	5.30	18.3	19.4	6.16	21.0	7.22	24.0	9.42	27.0
18.5	18.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
19	19.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
19.5	19.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
20	20.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
20.5	20.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
21	21.4	1	21.2	2.45	21.5	22.6	2.79	24.2	3.19	27.2	4.04	30.2
21.5	21.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
22	22.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0

DBH	Range	#of Trees	Measured DBH	BA	DBH	DBH	BA	DBH	BA	DBH	BA	DBH
22.5	22.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
23	23.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
23.5	23.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
24	24.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
24.5	24.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
25	25.4	1	25.3	3.49	25.6	26.7	3.89	28.3	4.37	31.3	5.34	34.3
25.5	25.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
26	26.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
26.5	26.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
27	27.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
27.5	27.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
28	28.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
28.5	28.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
29	29.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
29.5	29.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
30	30.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
30.5	30.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
31	31.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
31.5	31.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
32	32.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
32.5	32.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
33	33.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
33.5	33.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
34	34.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
34.5	34.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
35	35.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
35.5	35.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
36	36.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
36.5	36.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
37	37.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
37.5	37.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
38	38.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
38.5	38.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
39	39.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
39.5	39.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
40	40.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
40.5	40.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
41	41.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
41.5	41.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
42	42.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0

DBH	Range	#of Trees	Measured DBH	BA	DBH	DBH	BA	DBH	BA	DBH	BA	DBH
42.5	42.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
43	43.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
43.5	43.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
44	44.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
44.5	44.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
45	45.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
		# of Trees	**DBH**	**BA**	**DBH**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**
		36	**10.34**	**24.97**	**10.60**	**11.74**	**31.04**	**13.34**	**38.92**	**16.34**	**56.40**	**19.34**

Between tree spacing (feet): 34.78505426

Note: The

Basal Ar

124.69 154.98 194.30 281.56

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Tupelos e
Pecan ent
Cottonwo
Willow ent

Water hickory enter -0.6
Baldcypress enter -0.1

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

31.0	271.6	279.6	315.0	364.6	457.6	550.6
4.0	75.2	76.4	80.8	87.2	99.2	111.2
1.0	25.3	25.6	26.7	28.3	31.3	34.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
36.0	372.1	381.5	422.5	480.1	588.1	696.1

Name: Plaq Parish NFL - BLH, flood side only Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Correction Factor (see below): [ ] for : species

		#of Trees	TY 2O		TY21	TY25		TY30		TY40		TY 50		TY60	
DBH	Range		Measured DBH	BA	DBH	DBH	BA	DBH	BA	DBH	BA	DBH	BA	DBH	BA
6	6.4	5	6.2	1.05	6.5	7.5	1.52	9.0	2.21	11.8	3.80	14.6	5.81	17.6	8.45
6.5	6.9	13	6.7	3.18	7.0	8.0	4.51	9.5	6.40	12.3	10.73	15.1	16.17	18.1	23.23
7	7.4	14	7.2	3.96	7.5	8.5	5.48	10.0	7.64	12.8	12.51	15.6	18.58	18.6	26.42
7.5	7.9	4	7.7	1.29	8.0	9.0	1.76	10.5	2.41	13.3	3.86	16.0	5.57	19.0	7.86
8	8.4	13	8.2	4.77	8.5	9.5	6.37	11.0	8.58	13.8	13.50	16.5	19.26	19.5	26.91
8.5	8.9	1	8.8	0.42	9.1	10.1	0.55	11.6	0.73	14.4	1.13	17.2	1.61	20.2	2.23
9	9.4	5	9.2	2.31	9.5	10.5	2.99	12.0	3.93	14.8	5.97	17.6	8.45	20.6	11.57
9.5	9.9	8	9.8	4.19	10.1	11.1	5.35	12.6	6.93	15.4	10.35	18.2	14.45	21.2	19.61
10	10.4	2	10.4	1.18	10.7	11.7	1.49	13.2	1.90	16.0	2.79	18.8	3.86	21.8	5.18
10.5	10.9	1	10.8	0.64	11.1	12.1	0.80	13.6	1.01	16.4	1.47	19.2	2.01	22.2	2.69
12	12.4	2	12.0	1.57	12.3	13.3	1.94	14.8	2.39	17.6	3.38	20.5	4.58	23.5	6.02
12.5	12.9	2	12.9	1.82	13.2	14.2	2.21	15.7	2.69	18.5	3.73	21.4	5.00	24.4	6.49
13	13.4	4	13.2	3.80	13.5	14.5	4.61	16.0	5.58	18.8	7.71	21.8	10.37	24.8	13.42
13.5	13.9	5	13.7	5.12	14.0	15.0	6.17	16.5	7.42	19.3	10.16	22.3	13.56	25.3	17.46
14	14.4	2	14.0	2.14	14.3	15.4	2.59	16.8	3.08	19.6	4.19	22.6	5.57	25.6	7.15
14.5	14.9	2	14.5	2.29	14.8	15.9	2.76	17.3	3.26	20.1	4.41	23.1	5.82	26.1	7.43
15	15.4	4	15.1	4.97	15.4	16.5	5.94	17.9	6.99	20.7	9.35	23.7	12.25	26.7	15.55
15.5	15.9	2	15.7	2.69	16.0	17.1	3.19	18.5	3.73	21.3	4.95	24.3	6.44	27.3	8.13
16	16.4	1	16.0	1.40	16.3	17.4	1.65	18.8	1.93	21.6	2.54	24.6	3.30	27.6	4.15
16.5	16.9	1	16.6	1.50	16.9	18.0	1.77	19.4	2.05	22.2	2.69	25.2	3.46	28.2	4.34
17	17.4	2	17.2	3.23	17.5	18.6	3.77	20.0	4.36	22.8	5.67	25.8	7.26	28.8	9.05
19	19.4	1	19.0	1.97	19.3	20.5	2.28	21.8	2.59	24.6	3.30	27.6	4.15	30.6	5.11
19.5	19.9			0.00	WRONG	1.5	0.00	2.8	0.00	5.6	0.00	8.6	0.00	11.6	0.00
20	20.4	2	20.0	4.36	20.3	21.5	5.04	22.8	5.67	25.6	7.15	28.6	8.92	31.6	10.89
24	24.4	3	24.0	9.42	24.3	25.5	10.64	26.8	11.75	29.6	14.34	32.4	17.18	35.4	20.50
27	27.4	1	27.2	4.04	27.5	28.7	4.49	30.0	4.91	32.8	5.87	35.6	6.91	38.6	8.13
31	31.4	1	31.3	5.34	31.6	32.7	5.83	34.1	6.34	36.9	7.43	39.7	8.60	42.7	9.94
		# of Trees	**DBH**	**BA**	**DBH**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**
		101	**10.87**	**78.65**	**11.13**	**12.18**	**95.71**	**13.67**	**116.49**	**16.47**	**162.96**	**19.30**	**219.15**	**22.30**	**287.90**

Between tree spacing (feet): 20.76745359

Note: The

Basal Area

392.65 477.81 581.56 813.59 1094.10 1437.34

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3
Water hickory enter -0.6
Baldcypress enter -0.1
For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

87.0	809.6	832.2	922.4	1053.2	1296.8	1542.2	1803.2
12.0	229.4	232.9	246.8	263.0	296.6	332.0	368.0
2.0	58.5	59.1	61.4	64.1	69.7	75.3	81.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
101.0	1097.5	1124.1	1230.5	1380.3	1663.1	1949.5	2252.5

Plaq Parish NFL - BLH, flood side only

DBH	Range						# of Trees	Avg DBH
6	6.4	6.0	6	6			3	6.00
6.5	6.9	6.8	6.9				2	6.85
7	7.4	7.0	7.4	7.4	7		4	7.20
7.5	7.9	7.8	7.8	7.8	7.5	7.6	5	7.70
8	8.4	8.0	8				2	8.00
8.5	8.9	8.5	8.5				2	8.50
9	9.4	9.0	9	9	9.4		4	9.10
9.5	9.9	9.5	9.8				2	9.65
10	10.4	10.0					1	10.00
10.5	10.9	10.6					1	10.60
11	11.4	11.0	11.3				2	11.15
11.5	11.9						0	0.00
12	12.4						0	0.00
12.5	12.9						0	0.00
13	13.4	13.0					1	13.00
13.5	13.9						0	0.00
14	14.4	14.0	14				2	14.00
14.5	14.9						0	0.00
15	15.4						0	0.00
15.5	15.9						0	0.00
16	16.4						0	0.00
16.5	16.9						0	0.00
17	17.4						0	0.00
17.5	17.9						0	0.00
18	18.4	18.0	18	18			3	18.00
18.5	18.9						0	0.00
19	19.4						0	0.00
19.5	19.9						0	0.00
20	20.4						0	0.00
20.5	20.9						0	0.00
21	21.4	21.2					1	21.20
21.5	21.9						0	0.00
22	22.4						0	0.00
22.5	22.9						0	0.00
23	23.4						0	0.00
23.5	23.9						0	0.00
24	24.4						0	0.00
24.5	24.9						0	0.00
25	25.4	25.3					1	25.30
25.5	25.9						0	0.00
26	26.4						0	0.00
26.5	26.9						0	0.00
27	27.4						0	0.00

DBH	Range						# of Trees	Avg DBH
27.5	27.9						0	0.00
28	28.4						0	0.00
28.5	28.9						0	0.00
29	29.4						0	0.00
29.5	29.9						0	0.00
30	30.4						0	0.00
30.5	30.9						0	0.00
31	31.4						0	0.00
31.5	31.9						0	0.00
32	32.4						0	0.00
32.5	32.9						0	0.00
33	33.4						0	0.00
33.5	33.9						0	0.00
34	34.4						0	0.00
34.5	34.9						0	0.00
35	35.4						0	0.00
35.5	35.9						0	0.00
36	36.4						0	0.00
36.5	36.9						0	0.00
37	37.4						0	0.00
37.5	37.9						0	0.00
38	38.4						0	0.00
38.5	38.9						0	0.00
39	39.4						0	0.00
39.5	39.9						0	0.00
40	40.4						0	0.00
40.5	40.9						0	0.00
41	41.4						0	0.00
41.5	41.9						0	0.00
42	42.4						0	0.00
42.5	42.9						0	0.00
43	43.4						0	0.00
43.5	43.9						0	0.00
44	44.4						0	0.00
44.5	44.9						0	0.00
45	45.4						0	0.00

Site: Plaq Parish NFL -- BLH, flood side only

YOUNG TREE INGROWTH 0-5.9 INCHES

TARGET YEAR:			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30
DBH	-Range	# of trees	Measured DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH
1	1.4	5	1.14	1.4	1.7	1.9	2.2	2.4	2.7	2.9	3.2	3.4	3.7	3.9	4.2	4.5	4.7	5.0	6.2	7.5	8.8
1.5	1.9	17	1.62	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2	5.4	6.7	8.0	9.3
2	2.4	14	2.07	2.3	2.6	2.8	3.1	3.3	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.6	5.9	7.2	8.4	9.7
2.5	2.9	4	2.58	2.8	3.1	3.3	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.6	5.9	6.1	6.4	7.7	9.0	10.2
3	3.4	14	3.09	3.3	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.6	5.9	6.1	6.4	6.7	6.9	8.2	9.5	10.7
3.5	3.9	2	3.65	3.9	4.2	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.2	6.5	6.7	7.0	7.2	7.5	8.8	10.0	11.3
4	4.4	6	4.07	4.3	4.6	4.8	5.1	5.3	5.6	5.9	6.1	6.4	6.6	6.9	7.1	7.4	7.6	7.9	9.2	10.4	11.7
4.5	4.9	8	4.66	4.9	5.2	5.4	5.7	5.9	6.2	6.4	6.7	7.0	7.2	7.5	7.7	8.0	8.2	8.5	9.8	11.0	12.3
5	5.4	2	5.30	5.6	5.8	6.1	6.3	6.6	6.8	7.1	7.3	7.6	7.9	8.1	8.4	8.6	8.9	9.1	10.4	11.7	13.0
5.5	5.9	2	5.70	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0	8.3	8.5	8.8	9.0	9.3	9.5	10.8	12.1	13.4

YOUNG BI

DBH	-RANGE																									# of Trees	Avg. dbh
0	0.4		0.3	0.25																						2	0.25
0.5	0.9		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	23	0.50
1	1.4		1.2	1	1	1.25	1.25																			5	1.14
1.5	1.9		1.8	1.5	1.5	1.5	1.8	1.6	1.6	1.5	1.5	1.5	1.8	1.6	1.6	1.9	1.7	1.6	1.5							17	1.62
2	2.4		2.0	2	2	2	2	2	2.2	2	2	2.25	2.25	2	2.3	2										14	2.07
2.5	2.9		2.5	2.5	2.5	2.8																				4	2.58
3	3.4		3.1	3	3	3.3	3	3	3	3.3	3	3	3	3.1	3.2	3.2										14	3.09
3.5	3.9		3.8	3.5																						2	3.65
4	4.4		4.3	4	4	4	4	4.1																		6	4.07
4.5	4.9		4.8	4.5	4.5	4.9	4.5	4.9	4.7	4.5																8	4.66
5	5.4		5.4	5.2																						2	5.30
5.5	5.9		5.5	5.9																						2	5.70

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Name: Plaq Parish NFL -- all class BLH - protected side only

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Correction Factor (see below): [ ] for : species

DBH	Range	#of Trees	TY 20 Measured DE	BA	TY 1 DBH	5.0 DBH	BA	10.0 DBH	BA	TY 20 DBH	BA	30.0 DBH
6	6.4	5	6.1	1.00	6.4	7.5	1.52	9.1	2.24	12.1	3.97	15.1
6.5	6.9	2	6.8	0.50	7.0	8.2	0.72	9.8	1.04	12.8	1.77	15.8
7	7.4	7	7.1	1.95	7.4	8.5	2.79	10.1	3.93	13.1	6.59	16.1
7.5	7.9	4	7.5	1.24	7.8	8.9	1.74	10.5	2.42	13.5	3.99	16.5
8	8.4	6	8.2	2.19	8.5	9.6	3.00	11.2	4.09	14.2	6.58	17.2
8.5	8.9	4	8.6	1.59	8.8	10.0	2.16	11.6	2.91	14.6	4.62	17.6
9	9.4	2	9.0	0.88	9.3	10.4	1.18	12.0	1.57	15.0	2.45	18.0
9.5	9.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
10	10.4	3	10.0	1.64	10.3	11.4	2.13	13.0	2.77	16.0	4.19	19.0
10.5	10.9	2	10.6	1.21	10.8	12.0	1.56	13.6	2.00	16.6	2.99	19.6
11	11.4	1	11.0	0.66	11.3	12.4	0.84	14.0	1.07	17.0	1.58	20.0
11.5	11.9	2	11.6	1.47	11.9	13.0	1.84	14.6	2.33	17.6	3.38	20.6
12	12.4	2	12.0	1.57	12.3	13.4	1.96	15.0	2.45	18.0	3.53	21.0
12.5	12.9	1	12.5	0.85	12.8	13.9	1.05	15.5	1.31	18.5	1.87	21.5
13	13.4	1	13.0	0.92	13.3	14.4	1.13	16.0	1.40	19.0	1.97	22.0
13.5	13.9	2	13.7	2.05	14.0	15.1	2.49	16.7	3.04	19.7	4.23	22.7
14	14.4	3	14.1	3.27	14.4	15.5	3.95	17.1	4.80	20.1	6.63	23.1
14.5	14.9	4	14.6	4.66	14.9	16.0	5.59	17.6	6.77	20.6	9.27	23.6
15	15.4	1	15.0	1.23	15.3	16.4	1.47	18.0	1.77	21.0	2.41	24.0
15.5	15.9	2	15.6	2.65	15.9	17.0	3.15	18.6	3.77	21.6	5.09	24.6
16	16.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
16.5	16.9	1	16.7	1.52	17.0	18.1	1.79	19.7	2.12	22.7	2.81	25.7
17	17.4	5	17.0	7.92	17.3	18.4	9.27	20.0	10.95	23.0	14.48	26.0
17.5	17.9	3	17.6	5.05	17.8	19.0	5.89	20.6	6.92	23.6	9.09	26.6
18	18.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
18.5	18.9	1	18.5	1.87	18.8	19.9	2.16	21.5	2.52	24.5	3.27	27.5
19	19.4	1	19.2	2.01	19.5	20.6	2.31	22.2	2.69	25.2	3.46	28.2
19.5	19.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
20	20.4	4	20.1	8.84	20.4	21.5	10.11	23.1	11.67	26.1	14.89	29.1
20.5	20.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
21	21.4	2	21.0	4.81	21.3	22.4	5.47	24.0	6.28	27.0	7.95	30.0
21.5	21.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
22	22.4	2	22.0	5.28	22.3	23.4	5.97	25.0	6.82	28.0	8.55	31.0
22.5	22.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
23	23.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
23.5	23.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
24	24.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
24.5	24.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
25	25.4	1	25.2	3.46	25.5	26.6	3.86	28.2	4.34	31.2	5.31	34.2
25.5	25.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
26	26.4	1	26.4	3.80	26.7	27.8	4.22	29.4	4.71	32.4	5.73	35.4
26.5	26.9	1	26.5	3.83	26.8	27.9	4.25	29.5	4.75	32.5	5.76	35.5
27	27.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
27.5	27.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
28	28.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
28.5	28.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
29	29.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
29.5	29.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
30	30.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
30.5	30.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
31	31.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
31.5	31.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
32	32.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
32.5	32.9	1	32.6	5.80	32.9	34.0	6.30	35.6	6.91	38.6	8.13	41.6
33	33.4	1	33.2	6.01	33.5	34.6	6.53	36.2	7.15	39.2	8.38	42.2
33.5	33.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
34	34.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
34.5	34.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
35	35.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
35.5	35.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
36	36.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
36.5	36.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
37	37.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
37.5	37.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
38	38.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0

DBH	Range		Measured DE	BA	DBH	DBH	BA	DBH	BA	DBH	BA	DBH
38.5	38.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
39	39.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
39.5	39.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
40	40.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
40.5	40.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
41	41.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
41.5	41.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
42	42.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
42.5	42.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
43	43.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
43.5	43.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
44	44.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
44.5	44.9			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
45	45.4			0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0
		# of Trees	**DBH**	**BA**	**DBH**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**
		78	**13.30**	**91.72**	**13.57**	**14.70**	**108.39**	**16.30**	**129.49**	**19.30**	**174.92**	**22.30**

Between tree spacing (feet): 23.63179

Note: The

Basal Area

457.92 541.16 646.48 873.27

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3
Water hickory enter -0.6
Baldcypress enter -0.1
For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

52.0	503.3	516.8	576.1	659.3	815.3	971.3
21.0	390.0	396.1	419.4	453.0	516.0	579.0
5.0	143.9	145.4	150.9	158.9	173.9	188.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
78.0	1037.2	1058.2	1146.4	1271.2	1505.2	1739.2

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Name: Pla

Correction Factor (see below): [ ] for : species

DBH	Range	#of Trees	TY 20 Measured DBH	BA	TY21 DBH	TY21 DBH	TY25 DBH	BA	TY30 DBH	BA	TY40 DBH	BA	TY50 DBH	BA
6	6.4	79	6.2	16.56	6.5	6.5	7.5	24.07	9.0	34.90	11.8	59.99	14.6	91.84
6.5	6.9	41	6.7	10.04	7.0	7.0	8.0	14.22	9.5	20.18	12.3	33.83	15.1	50.99
7	7.4	32	7.2	9.05	7.5	7.5	8.5	12.54	10.0	17.45	12.8	28.59	15.6	42.47
7.5	7.9	15	7.7	4.85	8.0	8.0	9.0	6.59	10.5	9.02	13.3	14.47	16.0	20.89
8	8.4	23	8.2	8.43	8.5	8.5	9.5	11.26	11.0	15.18	13.8	23.89	16.5	34.07
8.5	8.9	13	8.7	5.37	9.0	9.0	10.0	7.05	11.5	9.38	14.3	14.50	17.1	20.73
9	9.4	6	9.2	2.77	9.5	9.5	10.5	3.59	12.0	4.71	14.8	7.17	17.6	10.14
9.5	9.9	6	9.7	3.08	10.0	10.0	11.0	3.94	12.5	5.11	15.3	7.66	18.1	10.72
10	10.4	5	10.1	2.78	10.4	10.4	11.4	3.53	12.9	4.54	15.7	6.72	18.5	9.33
10.5	10.9	6	10.7	3.75	11.0	11.0	12.0	4.69	13.5	5.96	16.3	8.69	19.1	11.94
11	11.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6	0.00	8.4	0.00
11.5	11.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6	0.00	8.6	0.00
12	12.4	5	12.1	3.99	12.4	12.4	13.4	4.93	14.9	6.05	17.7	8.54	20.6	11.57
12.5	12.9	2	12.8	1.79	13.1	13.1	14.1	2.18	15.6	2.65	18.4	3.69	21.3	4.95
13	13.4	7	13.1	6.55	13.4	13.4	14.4	7.96	15.9	9.65	18.7	13.35	21.7	17.98
13.5	13.9	4	13.5	3.98	13.8	13.8	14.8	4.80	16.3	5.80	19.1	7.96	22.1	10.66
14	14.4	6	14.2	6.60	14.5	14.5	15.6	7.96	17.0	9.46	19.8	12.83	22.8	17.01
14.5	14.9	4	14.6	4.65	14.9	14.9	16.0	5.58	17.4	6.61	20.2	8.90	23.2	11.74
15	15.4	2	15.0	2.45	15.3	15.3	16.4	2.93	17.8	3.46	20.6	4.63	23.6	6.08
15.5	15.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.6	0.00
16	16.4	3	16.0	4.19	16.3	16.3	17.4	4.95	18.8	5.78	21.6	7.63	24.6	9.90
16.5	16.9	2	16.6	3.01	16.9	16.9	18.0	3.53	19.4	4.11	22.2	5.38	25.2	6.93
17	17.4	1	17.0	1.58	17.3	17.3	18.4	1.85	19.8	2.14	22.6	2.79	25.6	3.57
17.5	17.9	2	17.6	3.38	17.9	17.9	19.0	3.94	20.4	4.54	23.2	5.87	26.2	7.49
18	18.4	1	18.0	1.77	18.3	18.3	19.5	2.06	20.8	2.36	23.6	3.04	26.6	3.86
18.5	18.9	1	18.5	1.87	18.8	18.8	20.0	2.17	21.3	2.47	24.1	3.17	27.1	4.01
19	19.4	1	19.0	1.97	19.3	19.3	20.5	2.28	21.8	2.59	24.6	3.30	27.6	4.15
19.5	19.9	2	19.7	4.23	20.0	20.0	21.2	4.88	22.5	5.52	25.3	6.98	28.3	8.74
20	20.4	3	20.1	6.61	20.4	20.4	21.6	7.63	22.9	8.58	25.7	10.81	28.7	13.48
20.5	20.9	4	20.6	9.26	20.9	20.9	22.1	10.66	23.4	11.95	26.2	14.98	29.1	18.47
21	21.4	1	21.0	2.41	21.3	21.3	22.5	2.76	23.8	3.09	26.6	3.86	29.5	4.75
21.5	21.9	2	21.6	5.09	21.9	21.9	23.1	5.82	24.4	6.49	27.2	8.07	30.1	9.88
22	22.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.5	0.00
22.5	22.9	1	22.7	2.81	23.0	23.0	24.2	3.19	25.5	3.55	28.3	4.37	31.1	5.28
23	23.4	5	23.0	14.43	23.3	23.3	24.5	16.37	25.8	18.15	28.6	22.31	31.4	26.89
23.5	23.9	3	23.6	9.11	23.9	23.9	25.1	10.31	26.4	11.40	29.2	13.95	32.0	16.75
24	24.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
24.5	24.9	1	24.5	3.27	24.8	24.8	26.0	3.69	27.3	4.06	30.1	4.94	32.9	5.90
25	25.4	1	25.2	3.46	25.5	25.5	26.7	3.89	28.0	4.28	30.8	5.17	33.6	6.16
25.5	25.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
26	26.4	3	26.1	11.15	26.4	26.4	27.6	12.46	28.9	13.67	31.7	16.44	34.5	19.47
26.5	26.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00

Site: Plaq Parish NFL - all BLH, protected side only

YOUNG TREE INGROWTH DBH 0- 5.9 INCHES

TARGET YEAR:			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30
DBH	-Range	# of trees	Measured DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH	DBH
1	1.4	79	1.06	1.3	1.6	1.8	2.1	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.1	4.4	4.6	4.9	6.2	7.4	8.7
1.5	1.9	44	1.59	1.8	2.1	2.4	2.6	2.9	3.1	3.4	3.6	3.9	4.1	4.4	4.7	4.9	5.2	5.4	6.7	8.0	9.2
2	2.4	32	2.08	2.3	2.6	2.8	3.1	3.4	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.7	5.9	7.2	8.5	9.7
2.5	2.9	15	2.63	2.9	3.1	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.2	6.5	7.7	9.0	10.3
3	3.4	25	3.14	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.2	6.5	6.7	7.0	8.2	9.5	10.8
3.5	3.9	13	3.55	3.8	4.1	4.3	4.6	4.8	5.1	5.3	5.6	5.8	6.1	6.4	6.6	6.9	7.1	7.4	8.7	9.9	11.2
4	4.4	6	4.05	4.3	4.6	4.8	5.1	5.3	5.6	5.8	6.1	6.3	6.6	6.9	7.1	7.4	7.6	7.9	9.2	10.4	11.7
4.5	4.9	7	4.64	4.9	5.2	5.4	5.7	5.9	6.2	6.4	6.7	6.9	7.2	7.4	7.7	8.0	8.2	8.5	9.7	11.0	12.3
5	5.4	5	5.02	5.3	5.5	5.8	6.0	6.3	6.6	6.8	7.1	7.3	7.6	7.8	8.1	8.3	8.6	8.8	10.1	11.4	12.7
5.5	5.9	8	5.64	5.9	6.2	6.4	6.7	6.9	7.2	7.4	7.7	7.9	8.2	8.4	8.7	9.0	9.2	9.5	10.7	12.0	13.3

DBH	Range																											# of trees	Avg dbh
0	0.4		0.3	0.25	0.3	0.3	0.25	0.25	0.25	0.25																		**8**	**0.26**
0.5	0.9	*																										**101**	**0.60**
1	1.4	*																										**79**	**1.06**
1.5	1.9	*																										**44**	**1.59**
2	2.4	*																										**32**	**2.08**
2.5	2.9		2.8	2.6	2.5	2.75	2.75	2.7	2.8	2.6	2.7	2.5	2.5	2.5	2.5	2.75	2.5											**15**	**2.63**
3	3.4		3.4	3	3.4	3.3	3.1	3.3	3.2	3.3	3.25	3	3	3	3.2	3.3	3.1	3	3	3	3.25	3	3	3	3.3	3	3	**25**	**3.14**
3.5	3.9		3.8	3.5	3.5	3.7	3.5	3.5	3.5	3.5	3.5	3.7	3.5	3.5	3.5													**13**	**3.55**
4	4.4		4.0	4.2	4	4.1	4	4																				**6**	**4.05**
4.5	4.9		4.8	4.5	4.8	4.75	4.5	4.6	4.5																			**7**	**4.64**
5	5.4		5.1	5	5	5	5																					**5**	**5.02**
5.5	5.9		5.8	5.5	5.7	5.7	5.6	5.5	5.7	5.7																		**8**	**5.64**

* Because of the large # of trees in these DBH ranges, these classes had to be calculated separately. The summary is located here, and worksheets can be provided upon request.

DBH	Range	#of Trees	TY 20 Measured DBH	BA	TY21 DBH	TY21 DBH	TY25 DBH	BA	TY30 DBH	BA	TY40 DBH	BA	TY50 DBH	BA
27	27.4	1	27.0	3.98	27.3	27.3	28.5	4.43	29.8	4.84	32.6	5.80	35.4	6.83
27.5	27.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
28	28.4	2	28.0	8.55	28.3	28.3	29.5	9.46	30.8	10.35	33.6	12.31	36.4	14.45
28.5	28.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
29	29.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
29.5	29.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6	0.00	8.4	0.00
30	30.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
30.5	30.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
31	31.4	1	31.2	5.31	31.5	31.5	32.6	5.80	34.0	6.30	36.8	7.39	39.6	8.55
31.5	31.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
32	32.4	1	32.4	5.73	32.7	32.7	33.8	6.23	35.2	6.76	38.0	7.88	40.8	9.08
32.5	32.9	1	32.5	5.76	32.8	32.8	33.9	6.27	35.3	6.80	38.1	7.92	40.9	9.12
33	33.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
33.5	33.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
34	34.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
34.5	34.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
35	35.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
35.5	35.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
36	36.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
36.5	36.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
37	37.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
37.5	37.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
38	38.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
38.5	38.9	1	0.0	0.00	WRONG	0.3	1.4	0.01	2.8	0.04	5.6	0.17	8.4	0.38
39	39.4	1	39.2	8.38	39.5	39.5	40.6	8.99	42.0	9.62	44.8	10.95	47.6	12.36
39.5	39.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
40	40.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
40.5	40.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
41	41.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
41.5	41.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
42	42.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
42.5	42.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
43	43.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
43.5	43.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
44	44.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
44.5	44.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
45	45.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6	0.00	8.4	0.00
		# of Trees	**DBH**	**BA**	**DBH**		**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**
		301	**10.09**	**223.97**	**10.35**	**#DIV/0!**	**11.40**	**271.48**	**12.89**	**329.56**	**15.69**	**460.88**	**18.50**	**619.57**

Between tree spacing (feet): 12.02986317

Note: The

Basal Area				
1118.18	1355.36	1645.31	2300.95	3093.19

DBH	Range	#of Trees	TY 20 Measured DBH	BA	TY21 DBH	TY21 DBH	TY25 DBH	BA	TY30 DBH	BA	TY40 DBH	BA	TY50 DBH	BA

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Tupelos en
Pecan ente
Cottonwoo
Willow ente

Water hickory enter -0.6
Baldcypress enter -0.1

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

256.0	2045.6	2111.5	2374.7	2762.4	3479.2	4196.7
33.0	668.2	677.9	716.7	760.6	853.0	949.3
10.0	282.6	285.5	297.2	310.6	338.6	366.6
2.0	39.2	39.8	42.0	44.8	50.4	56.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
301.0	3035.6	3114.6	3430.5	3878.4	4721.2	5568.6

Plaq Parish NFL -all class BLH - protected side of existing levee

DBH	Range								# of trees	Avg DBH
6	**6.4**	6.0	6	6.1	6	6.25			**5**	**6.07**
6.5	**6.9**	6.8	6.7						**2**	**6.75**
7	**7.4**	7.0	7.4	7.1	7.2	7	7	7.3	**7**	**7.14**
7.5	**7.9**	7.5	7.6	7.5	7.5				**4**	**7.53**
8	**8.4**	8.3	8.3	8	8.3	8	8.2		**6**	**8.18**
8.5	**8.9**	8.5	8.7	8.5	8.5				**4**	**8.55**
9	**9.4**	9.0	9						**2**	**9.00**
9.5	**9.9**								**0**	**0.00**
10	**10.4**	10.0	10	10					**3**	**10.00**
10.5	**10.9**	10.5	10.6						**2**	**10.55**
11	**11.4**	11.0							**1**	**11.00**
11.5	**11.9**	11.5	11.7						**2**	**11.60**
12	**12.4**	12.0	12						**2**	**12.00**
12.5	**12.9**	12.5							**1**	**12.50**
13	**13.4**	13.0							**1**	**13.00**
13.5	**13.9**	13.8	13.6						**2**	**13.70**
14	**14.4**	14.3	14	14.1					**3**	**14.13**
14.5	**14.9**	14.5	14.7	14.5	14.75				**4**	**14.61**
15	**15.4**	15.0							**1**	**15.00**
15.5	**15.9**	15.7	15.5						**2**	**15.60**
16	**16.4**								**0**	**0.00**
16.5	**16.9**	16.7							**1**	**16.70**
17	**17.4**	17.0	17	17.2	17	17			**5**	**17.04**
17.5	**17.9**	17.5	17.7	17.5					**3**	**17.57**
18	**18.4**								**0**	**0.00**
18.5	**18.9**	18.5							**1**	**18.50**
19	**19.4**	19.2							**1**	**19.20**
19.5	**19.9**								**0**	**0.00**
20	**20.4**	20.1	20.4	20	20				**4**	**20.13**
20.5	**20.9**								**0**	**0.00**
21	**21.4**	21.0	21						**2**	**21.00**
21.5	**21.9**								**0**	**0.00**
22	**22.4**	22.0	22						**2**	**22.00**
22.5	**22.9**								**0**	**0.00**
23	**23.4**								**0**	**0.00**
23.5	**23.9**								**0**	**0.00**
24	**24.4**								**0**	**0.00**
24.5	**24.9**								**0**	**0.00**
25	**25.4**	25.2							**1**	**25.20**
25.5	**25.9**								**0**	**0.00**
26	**26.4**	26.4							**1**	**26.40**
26.5	**26.9**	26.5							**1**	**26.50**
27	**27.4**								**0**	**0.00**
27.5	**27.9**								**0**	**0.00**
28	**28.4**								**0**	**0.00**
28.5	**28.9**								**0**	**0.00**
29	**29.4**								**0**	**0.00**
29.5	**29.9**								**0**	**0.00**

DBH	Range								# of trees	Avg DBH
30	30.4								0	0.00
30.5	30.9								0	0.00
31	31.4								0	0.00
31.5	31.9								0	0.00
32	32.4								0	0.00
32.5	32.9	32.6							1	32.60
33	33.4	33.2							1	33.20
33.5	33.9								0	0.00
34	34.4								0	0.00
34.5	34.9								0	0.00
35	35.4								0	0.00
35.5	35.9								0	0.00
36	36.4								0	0.00
36.5	36.9								0	0.00
37	37.4								0	0.00
37.5	37.9								0	0.00
38	38.4								0	0.00
38.5	38.9								0	0.00
39	39.4								0	0.00
39.5	39.9								0	0.00
40	40.4								0	0.00
40.5	40.9								0	0.00
41	41.4								0	0.00
41.5	41.9								0	0.00
42	42.4								0	0.00
42.5	42.9								0	0.00
43	43.4								0	0.00
43.5	43.9								0	0.00
44	44.4								0	0.00
44.5	44.9								0	0.00
45	45.4								0	0.00

Site: PlaqNFL -- Section 1, SWAMP -- CYPRESS TREES ONLY

Young Tree Ingrowth

YOUNG TREE INGROWTH

TARGET YEAR:			**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**20**	**25**	**30**	**50.0**
DBH	**-Range**	**# of trees**	**Measured DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**
1	**1.4**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
1.5	**1.9**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
2	**2.4**	1	2	2.3	2.5	2.8	3.0	3.3	3.5	3.8	4.0	4.3	4.6	4.8	5.1	5.3	5.6	5.8	7.1	8.4	9.7	14.8
2.5	**2.9**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
3	**3.4**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
3.5	**3.9**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
4	**4.4**	1	4.1	4.4	4.6	4.9	5.1	5.4	5.6	5.9	6.1	6.4	6.7	6.9	7.2	7.4	7.7	7.9	9.2	10.5	11.8	16.9
4.5	**4.9**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
5	**5.4**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5
5.5	**5.9**			FALSE	0.3	0.5	0.8	1.0	1.3	1.5	1.8	2.0	2.3	2.6	2.8	3.1	3.3	3.6	4.8	6.1	7.4	12.5

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Name: Plaq Parish NFL - Section 1 Swamp

Cypress Trees ONLY

Correction Factor (see below): [ ] for : species

DBH	Range	#of Trees Measured	TY 30 DBH	BA	TY31 DBH	TY21 DBH	TY35 DBH	BA	TY40 DBH	BA	TY 50 DBH
6	6.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
6.5	6.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
7	7.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
7.5	7.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
8	8.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
8.5	8.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
9	9.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
9.5	9.9	1	9.7	0.51	10.0	10.0	11.0	0.66	12.5	0.85	15.3
10	10.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
10.5	10.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
11	11.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
11.5	11.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
12	12.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
12.5	12.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
13	13.4			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
13.5	13.9			0.00	WRONG	0.3	1.3	0.00	2.8	0.00	5.6
14	14.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
14.5	14.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
15	15.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
15.5	15.9	1	15.6	1.33	15.9	15.9	17.0	1.58	18.4	1.85	21.2
16	16.4	2	16.4	2.93	16.7	16.7	17.8	3.46	19.2	4.02	22.0
16.5	16.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
17	17.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
17.5	17.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
18	18.4	1	18.4	1.85	18.7	18.7	19.9	2.15	21.2	2.45	24.0
18.5	18.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
19	19.4	1	19.0	1.97	19.3	19.3	20.5	2.28	21.8	2.59	24.6
19.5	19.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
20	20.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
20.5	20.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
21	21.4	2	21.3	4.95	21.6	21.6	22.8	5.67	24.1	6.34	26.9
21.5	21.9	1	21.7	2.57	22.0	22.0	23.2	2.94	24.5	3.27	27.3
22	22.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
22.5	22.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
23	23.4	1	23.0	2.89	23.3	23.3	24.5	3.27	25.8	3.63	28.6
23.5	23.9	3	23.7	9.19	24.0	24.0	25.2	10.39	26.5	11.49	29.3
24	24.4	1	24.2	3.19	24.5	24.5	25.7	3.60	27.0	3.98	29.8
24.5	24.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
25	25.4	2	25.2	6.93	25.5	25.5	26.7	7.78	28.0	8.55	30.8
25.5	25.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
26	26.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
26.5	26.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
27	27.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
27.5	27.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
28	28.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
28.5	28.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
29	29.4			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
29.5	29.9			0.00	WRONG	0.3	1.5	0.00	2.8	0.00	5.6
30	30.4	1	30.0	4.91	30.3	30.3	31.4	5.38	32.8	5.87	35.6
30.5	30.9	1	30.6	5.11	30.9	30.9	32.0	5.58	33.4	6.08	36.2
31	31.4	1	31.1	5.28	31.4	31.4	32.5	5.76	33.9	6.27	36.7
31.5	31.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
32	32.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
32.5	32.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
33	33.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6

DBH	Range	#of Trees Measured	TY 30 DBH	BA	TY31 DBH	TY21 DBH	TY35 DBH	BA	TY40 DBH	BA	TY 50 DBH
33.5	33.9	1	33.5	6.12	33.8	33.8	34.9	6.64	36.3	7.19	39.1
34	34.4	1	34.2	6.38	34.5	34.5	35.6	6.91	37.0	7.47	39.8
34.5	34.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
35	35.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
35.5	35.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
36	36.4	1	36.3	7.19	36.6	36.6	37.7	7.75	39.1	8.34	41.9
36.5	36.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
37	37.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
37.5	37.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
38	38.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
38.5	38.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
39	39.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
39.5	39.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
40	40.4	1		0.00	WRONG	0.3	1.4	0.01	2.8	0.04	5.6
40.5	40.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
41	41.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
41.5	41.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
42	42.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
42.5	42.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
43	43.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
43.5	43.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
44	44.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
44.5	44.9			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
45	45.4			0.00	WRONG	0.3	1.4	0.00	2.8	0.00	5.6
		# of Trees	DBH	BA	DBH		DBH	BA	DBH	BA	DBH
		23	22.79	73.28	23.09	#DIV/0!	24.29	81.81	25.71	90.27	28.63

Between tree spacing (feet): 43.51911

Note: The

Basal Area

365.85 408.43 450.69

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

Tupelos en
Pecan ente
Cottonwoo
Willow ente

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

1.0	9.7	10.0	11.0	12.5	15.3
13.0	268.4	272.2	287.5	304.8	341.2
7.0	209.8	211.8	219.8	229.4	249.0
2.0	36.3	37.1	40.5	44.7	53.1
0.0	0.0	0.0	0.0	0.0	0.0
23.0	524.2	531.1	558.8	591.4	658.6

Plaq Parish NFL
CYPRESS TREES ONLY

DBH	Range				# of trees	Avg dbh
6	6.4				0	0.00
6.5	6.9	6.6			1	6.60
7	7.4				0	0.00
7.5	7.9				0	0.00
8	8.4				0	0.00
8.5	8.9				0	0.00
9	9.4	9.4			1	9.40
9.5	9.9				0	0.00
10	10.4	10.0			1	10.00
10.5	10.9				0	0.00
11	11.4				0	0.00
11.5	11.9	11.9			1	11.90
12	12.4	12.3	12.2		2	12.25
12.5	12.9	12.7			1	12.70
13	13.4				0	0.00
13.5	13.9				0	0.00
14	14.4	14.0			1	14.00
14.5	14.9	14.7	14.5	14.75	3	14.65
15	15.4	15.2			1	15.20
15.5	15.9				0	0.00
16	16.4	16.4	16		2	16.20
16.5	16.9				0	0.00
17	17.4				0	0.00
17.5	17.9				0	0.00
18	18.4				0	0.00
18.5	18.9				0	0.00
19	19.4				0	0.00
19.5	19.9				0	0.00
20	20.4				0	0.00
20.5	20.9				0	0.00
21	21.4	21.0			1	21.00
21.5	21.9	21.6			1	21.60
22	22.4	22.1			1	22.10
22.5	22.9				0	0.00
23	23.4				0	0.00
23.5	23.9				0	0.00
24	24.4				0	0.00
24.5	24.9	24.5			1	24.50
25	25.4	25.2			1	25.20
25.5	25.9				0	0.00
26	26.4				0	0.00
26.5	26.9				0	0.00
27	27.4	27.3			1	27.30
27.5	27.9				0	0.00

DBH	Range				# of trees	Avg dbh
28	28.4				0	0.00
28.5	28.9				0	0.00
29	29.4				0	0.00
29.5	29.9				0	0.00
30	30.4				0	0.00
30.5	30.9				0	0.00
31	31.4				0	0.00
31.5	31.9				0	0.00
32	32.4				0	0.00
32.5	32.9				0	0.00
33	33.4				0	0.00
33.5	33.9				0	0.00
34	34.4				0	0.00
34.5	34.9				0	0.00
35	35.4				0	0.00
35.5	35.9				0	0.00
36	36.4				0	0.00
36.5	36.9				0	0.00
37	37.4				0	0.00
37.5	37.9				0	0.00
38	38.4				0	0.00
38.5	38.9				0	0.00
39	39.4				0	0.00
39.5	39.9				0	0.00
40	40.4	40.1			1	40.10
40.5	40.9				0	0.00
41	41.4				0	0.00
41.5	41.9				0	0.00
42	42.4				0	0.00
42.5	42.9				0	0.00
43	43.4				0	0.00
43.5	43.9				0	0.00
44	44.4				0	0.00
44.5	44.9				0	0.00
45	45.4				0	0.00

Site: PlaqNFL -- Section 1, Swamp -- NONcypress trees

YOUNG TREE INGROWTH

TARGET YEAR:			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30
DBH	**-Range**	**# of trees**	**Measured DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**	**DBH**
1	**1.4**	17	1.03	1.3	1.5	1.8	2.1	2.3	2.6	2.8	3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.9	6.1	7.4	8.7
1.5	**1.9**	8	1.625	1.9	2.1	2.4	2.6	2.9	3.2	3.4	3.7	3.9	4.2	4.4	4.7	4.9	5.2	5.5	6.7	8.0	9.3
2	**2.4**	5	2.17	2.4	2.7	2.9	3.2	3.4	3.7	4.0	4.2	4.5	4.7	5.0	5.2	5.5	5.7	6.0	7.3	8.5	9.8
2.5	**2.9**	10	2.56	2.8	3.1	3.3	3.6	3.8	4.1	4.3	4.6	4.9	5.1	5.4	5.6	5.9	6.1	6.4	7.7	8.9	10.2
3	**3.4**	7	3.09	3.3	3.6	3.9	4.1	4.4	4.6	4.9	5.1	5.4	5.6	5.9	6.2	6.4	6.7	6.9	8.2	9.5	10.7
3.5	**3.9**	5	3.72	4.0	4.2	4.5	4.7	5.0	5.3	5.5	5.8	6.0	6.3	6.5	6.8	7.0	7.3	7.5	8.8	10.1	11.4
4	**4.4**	1	4.4	4.7	4.9	5.2	5.4	5.7	5.9	6.2	6.4	6.7	7.0	7.2	7.5	7.7	8.0	8.2	9.5	10.8	12.1
4.5	**4.9**	2	4.7	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.3	7.5	7.8	8.0	8.3	8.5	9.8	11.1	12.4
5	**5.4**	6	5.15	5.4	5.7	5.9	6.2	6.4	6.7	6.9	7.2	7.4	7.7	8.0	8.2	8.5	8.7	9.0	10.3	11.5	12.8
5.5	**5.9**	3	5.63	5.9	6.1	6.4	6.7	6.9	7.2	7.4	7.7	7.9	8.2	8.4	8.7	8.9	9.2	9.5	10.7	12.0	13.3

YOUNG TREE DBH AVERAGE

DBH	**Range**																			**# of trees**	**Avg dbh**
0	**0.4**	0.3	0.25	0.25																**3**	**0.25**
0.5	**0.9**	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5								**11**	**0.50**
1	**1.4**	1.3	1.3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		**17**	**1.03**
1.5	**1.9**	1.9	1.7	1.7	1.7	1.5	1.5	1.5	1.5											**8**	**1.63**
2	**2.4**	2.1	2.2	2.3	2.25	2														**5**	**2.17**
2.5	**2.9**	2.7	2.6	2.8	2.5	2.5	2.5	2.5	2.5	2.5	2.5									**10**	**2.56**
3	**3.4**	3.0	3.1	3.4	3.1	3	3	3												**7**	**3.09**
3.5	**3.9**	3.6	3.8	3.9	3.8	3.5														**5**	**3.72**
4	**4.4**	4.4																		**1**	**4.40**
4.5	**4.9**	4.9	4.5																	**2**	**4.70**
5	**5.4**	5.0	5.1	5.25	5	5.3	5.25													**6**	**5.15**
5.5	**5.9**	5.8	5.5	5.6																**3**	**5.63**

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Name: F

Correction Factor (see below): [ ] for : species

DBH	Range	#of Trees	TY 0 Measured DBH	BA	TY 1 DBH	TY 5 DBH	BA	TY 10 DBH	BA	TY 20 DBH	BA	30.0 DBH	BA
6	6.4	3	6.0	0.60	6.3	7.4	0.90	9.0	1.34	12.0	2.37	15.0	3.70
6.5	6.9	2	6.7	0.48	6.9	8.1	0.71	9.7	1.02	12.7	1.75	15.7	2.67
7	7.4	4	7.0	1.08	7.3	8.4	1.55	10.0	2.19	13.0	3.70	16.0	5.60
7.5	7.9	2	7.8	0.66	8.0	9.2	0.91	10.8	1.26	13.8	2.06	16.8	3.06
8	8.4	2	8.2	0.73	8.5	9.6	1.01	11.2	1.37	14.2	2.20	17.2	3.23
8.5	8.9	3	8.7	1.24	9.0	10.1	1.67	11.7	2.25	14.7	3.54	17.7	5.14
9	9.4	1	9.3	0.47	9.6	10.7	0.62	12.3	0.83	15.3	1.28	18.3	1.83
9.5	9.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0	0.00
10	10.4	5	10.3	2.87	10.5	11.7	3.70	13.3	4.79	16.3	7.20	19.3	10.11
10.5	10.9	4	10.5	2.42	10.8	11.9	3.10	13.5	3.99	16.5	5.96	19.5	8.32
11	11.4	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0	0.00
11.5	11.9	4	11.8	3.01	12.0	13.2	3.77	14.8	4.75	17.8	6.87	20.8	9.39
12	12.4	2	12.2	1.61	12.4	13.6	2.00	15.2	2.50	18.2	3.59	21.2	4.88
12.5	12.9	1	12.5	0.85	12.8	13.9	1.05	15.5	1.31	18.5	1.87	21.5	2.52
13	13.4	1	13.3	0.96	13.5	14.7	1.17	16.3	1.44	19.3	2.02	22.3	2.70
13.5	13.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0	0.00
14	14.4	1	14.1	1.08	14.4	15.5	1.31	17.1	1.59	20.1	2.20	23.1	2.91
14.5	14.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0	0.00
15	15.4	1	15.4	1.29	15.7	16.8	1.54	18.4	1.85	21.4	2.50	24.4	3.25
15.5	15.9	0	0.0	0.00	WRONG	1.4	0.00	3.0	0.00	6.0	0.00	9.0	0.00
16	16.4	1	16.0	1.40	16.3	17.4	1.65	19.0	1.97	22.0	2.64	25.0	3.41
21.5	21.9	1	21.7	2.57	22.0	23.1	2.91	24.7	3.33	27.7	4.18	30.7	5.14
		# of Trees	**DBH**	**BA**	**DBH**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**	**DBH**	**BA**
		38	**10.12**	**23.31**	**10.38**	**11.52**	**29.59**	**13.12**	**37.76**	**16.12**	**55.94**	**19.12**	**77.84**

Between tree spacing (feet): 33.85728562

Note: Tl

Basal Area (

116.40 147.73 188.52 279.26 388.63

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3
Water hickory enter -0.6
Baldcypress enter -0.1

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3
For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

36.0	346.8	356.0	397.2	454.8	562.8	670.8
2.0	37.7	38.3	40.5	43.7	49.7	55.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
38.0	384.5	394.3	437.7	498.5	612.5	726.5

Average diameter growth rates for trees free to grow in unmanaged stands on average blh sites

Name: Plaq Parish NFL - Section 1 Swamp -- Non-cypre Taken from: USDA, Agriculture Handbook No. 181, Nov. 1960

Correction Factor (see below): for: species

DBH	Range	#of Trees Measured	TY3O DBH	BA	TY35 DBH	BA	TY40 DBH	BA	TY50 DBH	BA
9.5	9.9	5	9.8	2.62	11.1	3.34	12.6	4.33	15.4	6.47
10	10.4	29	10.2	16.46	11.5	20.83	13.0	26.73	15.8	39.48
10.5	10.9			0.00	1.3	0.00	2.8	0.00	5.6	0.00
11	11.4	4	11.4	2.84	12.7	3.50	14.2	4.40	17.0	6.30
11.5	11.9			0.00	1.3	0.00	2.8	0.00	5.6	0.00
12	12.4			0.00	1.3	0.00	2.8	0.00	5.6	0.00
12.5	12.9			0.00	1.3	0.00	2.8	0.00	5.6	0.00
13	13.4	15	13.2	14.25	14.5	17.30	16.0	20.94	18.8	28.91
13.5	13.9	11	13.9	11.59	15.2	13.93	16.7	16.73	19.5	22.81
14	14.4	7	14.0	7.48	15.4	9.05	16.8	10.78	19.6	14.67
14.5	14.9			0.00	1.4	0.00	2.8	0.00	5.6	0.00
15	15.4	3	15.0	3.68	16.4	4.40	17.8	5.18	20.6	6.94
15.5	15.9	9	15.7	12.10	17.1	14.35	18.5	16.80	21.3	22.27
16	16.4	4	16.0	5.58	17.4	6.61	18.8	7.71	21.6	10.18
16.5	16.9	1	16.8	1.54	18.2	1.81	19.6	2.10	22.4	2.74
17	17.4	2	17.2	3.23	18.6	3.77	20.0	4.36	22.8	5.67
20.5	20.9	3	20.8	7.08	22.3	8.14	23.6	9.11	26.4	11.40
23	23.4	1	23.1	2.91	24.6	3.30	25.9	3.66	28.7	4.49
23.5	23.9			0.00	1.5	0.00	2.8	0.00	5.6	0.00
24	24.4	1	24.4	3.25	25.9	3.66	27.2	4.04	30.0	4.91
24.5	24.9			0.00	1.5	0.00	2.8	0.00	5.6	0.00
25	25.4	1	25.0	3.41	26.5	3.83	27.8	4.22	30.6	5.11
30.5	30.9	1	30.7	5.14	32.1	5.62	33.5	6.12	36.3	7.19
		# of Trees	DBH	BA	DBH	BA	DBH	BA	DBH	BA
		97	13.47	103.16	14.81	123.45	16.27	147.20	19.07	199.55

Between tree spacing (feet): 21.19132

Note: The

Basal Area

515.00 616.30 734.91 996.24

Correction Factors:

Because of the great variation in growth rates between species and sites the above calculations may over/under estimate the actual dbh. Also, many species may have matured and began dying before reaching the projected dbh. To help refine dbh calculations the following rough approximate correction factors are given for stands HEAVILY dominated by the following species, these factors should be entered into cell D4:

Overcup oak enter -0.7
Red oaks enter +1.1
White oaks enter -0.2
Ashes enter -0.3

For stands dominated by American elm, maples, American sycamore, honeylocust, and waterlocust use a correction factor of +0.3

For stands dominated by cedar elm, winged elm, black tupelo, hickories, or sugarberry use a correction factor of -0.6

74.0	884.3	981.6	1091.5	1298.7
21.0	366.4	396.3	425.2	484.0
2.0	55.7	58.6	61.3	66.9
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
97.0	1306.4	1436.5	1578.0	1849.6

Plaq Parish NFL Swamp
NONcypress trees

DBH	Range						# of trees	Avg dbh
6	6.4	6.0	6.1	6			3	6.03
6.5	6.9	6.8	6.5				2	6.65
7	7.4	7.0	7.1	7	7		4	7.03
7.5	7.9	7.7	7.8				2	7.75
8	8.4	8.4	8				2	8.20
8.5	8.9	8.9	8.5	8.75			3	8.72
9	9.4	9.3					1	9.30
9.5	9.9						0	0.00
10	10.4	10.2	10.4	10.25	10	10.4	5	10.25
10.5	10.9	10.5	10.5	10.6	10.5		4	10.53
11	11.4						0	0.00
11.5	11.9	11.6	11.7	11.8	11.9		4	11.75
12	12.4	12.3	12				2	12.15
12.5	12.9	12.5					1	12.50
13	13.4	13.3					1	13.25
13.5	13.9						0	0.00
14	14.4	14.1					1	14.10
14.5	14.9						0	0.00
15	15.4	15.4					1	15.40
15.5	15.9						0	0.00
16	16.4	16.0					1	16.00
16.5	16.9						0	0.00
17	17.4						0	0.00
17.5	17.9						0	0.00
18	18.4						0	0.00
18.5	18.9						0	0.00
19	19.4						0	0.00
19.5	19.9						0	0.00
20	20.4						0	0.00
20.5	20.9						0	0.00
21	21.4						0	0.00
21.5	21.9	21.7					1	21.70
22	22.4						0	0.00
22.5	22.9						0	0.00
23	23.4						0	0.00
23.5	23.9						0	0.00
24	24.4						0	0.00
24.5	24.9						0	0.00
25	25.4						0	0.00
25.5	25.9						0	0.00
26	26.4						0	0.00

DBH	Range						# of trees	Avg dbh
26.5	26.9						0	0.00
27	27.4						0	0.00
27.5	27.9						0	0.00
28	28.4						0	0.00
28.5	28.9						0	0.00
29	29.4						0	0.00
29.5	29.9						0	0.00
30	30.4						0	0.00
30.5	30.9						0	0.00
31	31.4						0	0.00
31.5	31.9						0	0.00
32	32.4						0	0.00
32.5	32.9						0	0.00
33	33.4						0	0.00
33.5	33.9						0	0.00
34	34.4						0	0.00
34.5	34.9						0	0.00
35	35.4						0	0.00
35.5	35.9						0	0.00
36	36.4						0	0.00
36.5	36.9						0	0.00
37	37.4						0	0.00
37.5	37.9						0	0.00
38	38.4						0	0.00
38.5	38.9						0	0.00
39	39.4						0	0.00
39.5	39.9						0	0.00
40	40.4						0	0.00
40.5	40.9						0	0.00
41	41.4						0	0.00
41.5	41.9						0	0.00
42	42.4						0	0.00
42.5	42.9						0	0.00
43	43.4						0	0.00
43.5	43.9						0	0.00
44	44.4						0	0.00
44.5	44.9						0	0.00
45	45.4						0	0.00

ATTACHMENT 4
COMBINED FIELD SITE DATA WORKSHEETS

Project: Plaq Parish NFL

TY0

Habitat Type: BLH, flood side only

Sites:	A_Sect5	B_Sect5	D_Sect5	E_Sect3	I_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	100	95	100	20	5	64.0	47.4
% overstory softmast	0	0	0	30	95	25.0	41.2
% canopy closure	30	75	5	55	40	41.0	26.3
% understory	5	5	15	40	95	32.0	38.0
% mid story	99	60	90	75	45	73.8	21.9
# tree sps in mid story	2	2	0	4	4	2.4	1.7
# tree sps in understory	0	2	0	4	5	2.2	2.3
# snags > or = 6"	0	0	0	0	0	0.0	0.0
# snags > or = 8"	0	0	0	0	0	0.0	0.0
distance (from sample) to nearest hardmast (feet)							
	class 5	class 5	class 5	class 5	class 2	AVG = class 5	

TY20

Habitat Type: BLH, flood side only

Sites:	A_Sect5	B_Sect5	D_Sect5	E_Sect3	I_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	75	70	80	20	5	50.0	34.8
% overstory softmast	0	0	0	45	95	28.0	42.2
% canopy closure							
% understory	5	5	10	30	80	26.0	31.9
% mid story	90	55	85	60	40	66.0	21.0
# tree sps in mid story							
# tree sps in understory							
# snags > or = 6"							
# snags > or = 8"							
distance (from sample) to nearest hardmast (feet)							
						AVG = class 5	

TY50

Habitat Type: BLH, flood side only

Sites:	A_Sect5	B_Sect5	D_Sect5	E_Sect3	I_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	50	45	60	25	5	37.0	22.0
% overstory softmast	0	0	0	55	95	30.0	43.4
% canopy closure							
% understory	5	5	5	20	65	20.0	26.0
% mid story	85	50	80	55	35	61.0	21.0
# tree sps in mid story							
# tree sps in understory							
# snags > or = 6"							
# snags > or = 8"							
distance (from sample) to nearest hardmast (feet)							
						AVG = class 5	

Project: Plaq Parish NFL

TY0

Habitat Type: BLH, protected side only

Sites:	C_Sect5	F_Sect1	G_Sect1	H_Sect2	J_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	35	35	10	5	5	12.9	15.5
% overstory softmast	20	65	90	80	95	78.6	28.7
% canopy closure	60	70	70	40	50	58.6	10.7
% understory	10	25	50	20	80	42.9	27.1
% mid story	30	75	50	40	60	53.6	14.9
# tree sps in mid story	2	7	6	4	8	5.0	2.2
# tree sps in understory	3	6	5	4	2	4.0	1.4
# snags > or = 6"	0	0	1	0	0	0.1	0.4
# snags > or = 8"	0	0	0	0	0	0.0	0.0
distance (from sample) to nearest hardmast (feet)							
	class 5	class 5	class 2	class 2	class 2	AVG = class 4	

TY20

Habitat Type: BLH, protected side only

Sites:	C_Sect5	F_Sect1	G_Sect1	H_Sect2	J_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	45	45	5	5	10	16.4	19.7
% overstory softmast	10	55	95	70	90	73.6	32.4
% canopy closure							
% understory	10	15	45	15	70	35.7	24.7
% mid story	20	65	40	30	50	43.6	14.9
# tree sps in mid story							
# tree sps in understory							
# snags > or = 6"							
# snags > or = 8"							
distance (from sample) to nearest hardmast (feet)							
						AVG= class 4	

TY50

Habitat Type: BLH, protected side only

Sites:	C_Sect5	F_Sect1	G_Sect1	H_Sect2	J_Sect1	MEAN	STDV
mean dbh							
% Overstory hardmast	50	50	5	5	15	19.3	21.5
% overstory softmast	5	50	95	60	85	69.3	33.8
% canopy closure							
% understory	5	10	40	10	60	28.6	22.9
% mid story	20	55	30	20	40	35.0	12.6
# tree sps in mid story							
# tree sps in understory							
# snags > or = 6"							
# snags > or = 8"							
distance (from sample) to nearest hardmast (feet)							
						AVG= class 4	

Project: PlaqNFL -- Section 1, Swamps

TY0

Habitat Type: Swamp

	Sites:	M_Sect1	N_Sect1	O_Sect1	P_Sect1	Q_Sect1		MEAN	STDV
% canopy closure		50	20	20	30	80		40.0	25.5
% understory		95	95	95	100	80		93.0	7.6
% mid story		40	10	10	5	55		24.0	22.2
% Cypress		80	100	100	10	45		67.0	39.0
mean dbh Cypress							19.17	19.2	
% Tupelo et al.		20	0	0	90	55		33.0	39.0
mean dbh Tupelo et al.							10.12	10.1	
Basal area									
# tree sps in mid story									
# tree sps in understory									
# snags > or = 6"		1			2	2		1.7	0.6
# snags > or = 8"									
distance (from sample) to nearest hardmast (feet)									

TY30

Habitat Type: Swamp

	Sites:	M_Sect1	N_Sect1	O_Sect1	P_Sect1	Q_Sect1		MEAN	STDV
% canopy closure		55						55.0	
% understory		90						90.0	
% mid story		40						40.0	
% Cypress									
mean dbh Cypress		22.79						22.8	
% Tupelo et al.									
mean dbh Tupelo et al.		13.45						13.5	
Basal area									
# tree sps in mid story									
# tree sps in understory									
# snags > or = 6"									
# snags > or = 8"									
distance (from sample) to nearest hardmast (feet)									

TY50

Date

Habitat Type: Swamp

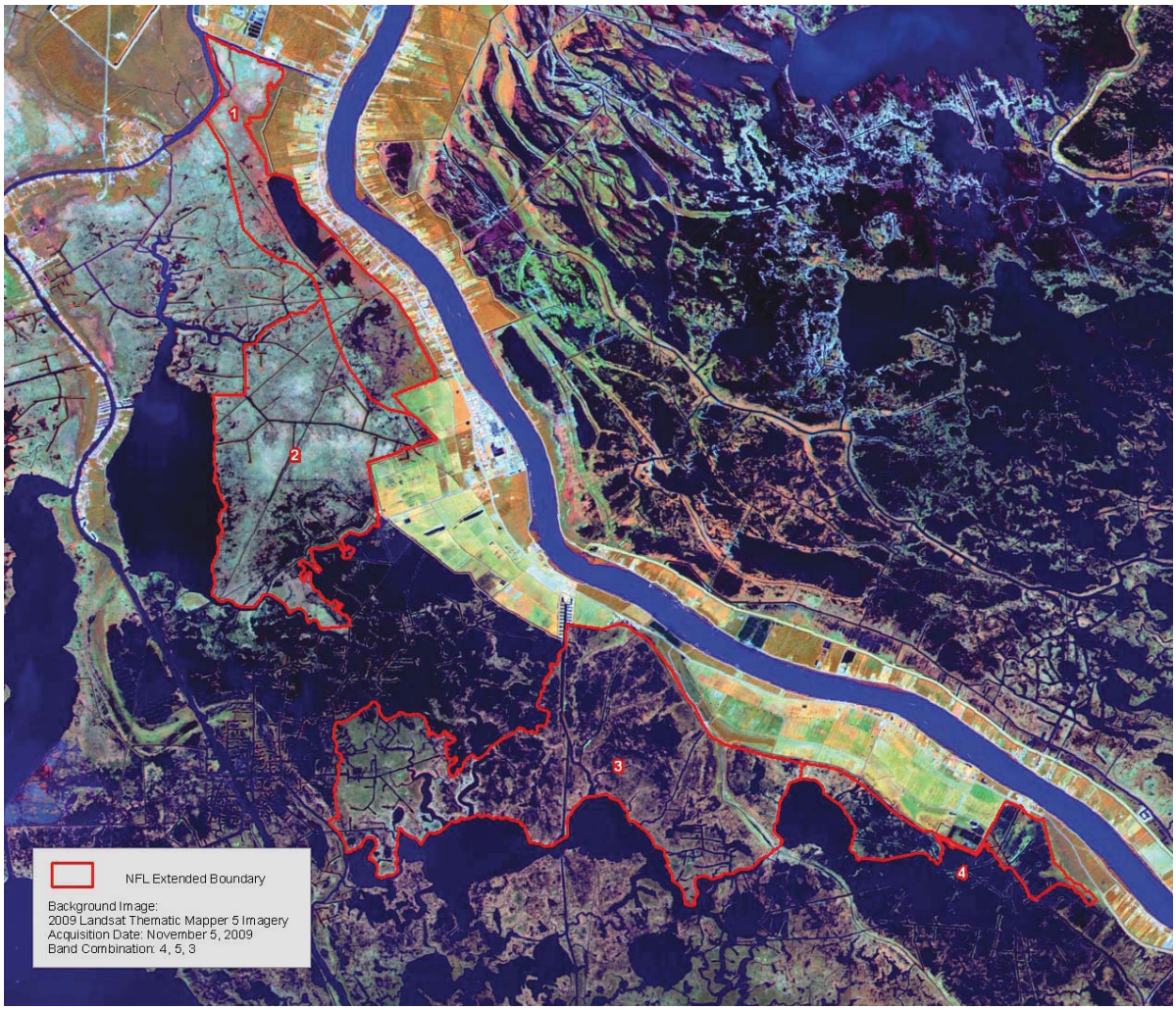
	Sites:	M_Sect1	N_Sect1	O_Sect1	P_Sect1	Q_Sect1		MEAN	STDV
% canopy closure		60						60.0	
% understory		90						90.0	
% mid story		35						35.0	
% Cypress									
mean dbh Cypress		28.63						28.6	
% Tupelo et al.									
mean dbh Tupelo et al.		19.05						19.1	
Basal area									
# tree sps in mid story									
# tree sps in understory									
# snags > or = 6"									
# snags > or = 8"									
distance (from sample) to nearest hardmast (feet)									

ATTACHMENT 5
LAND USE SPREADSHEETS

Land use for Swamp and BLH

Levee Section	Forest/Marsh	Abandoned AG, etc.	Pasture	Water	Active AG	Development	TOTAL w/in 0.5-mile Radius
	(acres)	*(acres)*	*(acres)*	*(acres)*	*(acres)*	*(acres)*	*(acres)*
Section 1 (BLH)	2589.61	98.35	517.27	931.86	232.98	990.95	5361.02
Section 2	846.42	128.93	683.43	318.65	16.51	110.09	2104.02
Section 3	412.98	54.06	53.77	286.46	0.00	197.61	1004.89
Section 4	1036.86	0.00	923.71	343.57	0.00	117.72	2421.86
Section 5	841.01	222.83	188.99	808.71	0.00	240.85	2302.40
TOTALS	**5726.88**	**504.18**	**2367.18**	**2689.25**	**249.49**	**1657.21**	**13194.19**
PERCENTAGES							
Levee Section	**Forest/Marsh**	**Abandoned AG, etc.**	**Pasture**	**Water**	**Active AG**	**Development**	
Section 1 (BLH)	48.30%	1.83%	9.65%	17.38%	4.35%	18.48%	99.99%
Section 2	40.23%	6.13%	32.48%	15.14%	0.78%	5.23%	99.99%
Section 3	41.10%	5.38%	5.35%	28.51%	0.00%	19.66%	100.00%
Section 4	42.81%	0.00%	38.14%	14.19%	0.00%	4.86%	100.00%
Section 5	36.53%	9.68%	8.21%	35.12%	0.00%	10.46%	100.00%
AVERAGES	**41.79%**	**4.60%**	**18.77%**	**22.07%**	**1.03%**	**11.74%**	**100.00%**

ATTACHMENT 6
LAND LOSS SPREADSHEETS


1
2
3
4
NFL Extended Boundary
Background Image:
2009 Landsat Thematic Mapper 5 Imagery
Acquisition Date: November 5, 2009
Band Combination: 4, 5, 3

Plaquemines Parish Non-Federal Levee
(NFL) Project Extended Boundaries

Data Source	Acquisition Date	Water Level Meters	Class	Area 1	Area 2	Area 3	Area 4	Total
Area Units = Acres			Out	0	0	0	0	0
TM	**1/19/1985**	1.77	TM Land	4,404	8,887	11,892	1,824	27,007
Provisional Data			TM Water	1,300	1,219	3,676	753	6,948
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**1/28/1988**	1.53	TM Land	4,532	9,305	12,968	2,037	28,842
Provisional Data			TM Water	1,172	801	2,600	540	5,113
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/1/1990**	2.00	TM Land	4,341	8,743	11,230	1,701	26,015
Provisional Data			TM Water	1,363	1,363	4,338	876	7,940
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**9/28/1995**	2.09	TM Land	5,032	9,119	9,479	1,480	25,110
Provisional Data			TM Water	672	987	6,089	1,097	8,845
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**2/24/1998**	1.72	TM Land	4,232	8,971	11,745	1,784	26,732
Provisional Data			TM Water	1,472	1,135	3,823	793	7,223
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/18/1999**	1.97	TM Land	4,816	8,853	10,897	1,672	26,238
Provisional Data			TM Water	888	1,253	4,671	905	7,717
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/30/2001**	1.97	TM Land	4,497	8,843	11,307	1,757	26,404
Provisional Data			TM Water	1,207	1,263	4,261	820	7,551
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**2/27/2002**	1.66	TM Land	4,104	8,894	11,868	1,841	26,707
Provisional Data			TM Water	1,600	1,212	3,700	736	7,248
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/7/2004**	1.97	TM Land	4,493	8,707	10,899	1,647	25,746
Provisional Data			TM Water	1,211	1,399	4,669	930	8,209
				5,704	**10,106**	**15,568**	**2,577**	**33,955**

			Out	0	0	0	0	0
TM	**10/25/2005**	1.86	TM Land	4,450	8,746	11,050	1,355	25,601
Provisional Data			TM Water	1,254	1,360	4,518	1,222	8,354
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/28/2006**	1.99	TM Land	4,298	8,571	10,762	1,343	24,974
Provisional Data			TM Water	1,406	1,535	4,806	1,234	8,981
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/1/2008**	2.10	TM Land	4,301	8,540	10,667	1,455	24,963
Provisional Data			TM Water	1,403	1,566	4,901	1,122	8,992
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
TM + 2007 Marsh Types	**11/5/2009**	2.04	Out	0	0	0	0	0
Provisional Data			Fresh Marsh	4,664	5	0	0	4,669
NOTE: this assumes same marsh types			Intermediate Marsh	9	8,977	0	0	8,986
are present in 2009.			Brackish Marsh	0	1	10,826	1	10,828
			Saline Marsh	0	0	0	1,424	1,424
			Swamp	0	0	0	0	0
			Developed Ag Other	15	3	3	6	27
			Fresh Marsh Water	1,015	0	0	0	1,015
			Intermediate Marsh Water	0	1,120	0	0	1,120
			Brackish Marsh Water	0	0	4,738	0	4,738
			Saline Marsh Water	0	0	0	1,145	1,145
			Swamp Water	0	0	0	0	0
			Developed Ag Other Water	1	0	1	1	3
				5,704	**10,106**	**15,568**	**2,577**	**33,955**

Analysis completed 09/22/2010.

Produced for Plaquemines Parish Non-Federal Levee (NFL) Project Extended Boundaries

NOTE: Land/Water data are provisional, have not gone through a reveiw process, and can change pending the review process.

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	Total Area	Land	Water	Out	Total
	1/19/1985	27,007	6,948	0	33,955
	1/28/1988	28,842	5,113	0	33,955
	11/1/1990	26,015	7,940	0	33,955
	9/28/1995	25,110	8,845	0	33,955
	2/24/1998	26,732	7,223	0	33,955
	11/18/1999	26,238	7,717	0	33,955
	10/30/2001	26,404	7,551	0	33,955
	2/27/2002	26,707	7,248	0	33,955
	11/7/2004	25,746	8,209	0	33,955
Post Hurricane	10/25/2005	25,601	8,354	0	33,955
	10/28/2006	24,974	8,981	0	33,955
Post Hurricane	10/1/2008	24,963	8,992	0	33,955
	11/5/2009	25,934	8,021	0	33,955

	Area 1	Land	Water	Out	Total
	1/19/1985	4,404	1,300	0	5,704
	1/28/1988	4,532	1,172	0	5,704
	11/1/1990	4,341	1,363	0	5,704
	9/28/1995	5,032	672	0	5,704
	2/24/1998	4,232	1,472	0	5,704
	11/18/1999	4,816	888	0	5,704
	10/30/2001	4,497	1,207	0	5,704
	2/27/2002	4,104	1,600	0	5,704
	11/7/2004	4,493	1,211	0	5,704
Post Hurricane	10/25/2005	4,450	1,254	0	5,704
	10/28/2006	4,298	1,406	0	5,704
Post Hurricane	10/1/2008	4,301	1,403	0	5,704
	11/5/2009	4,688	1,016	0	5,704

	Area 2	Land	Water	Out	Total
	1/19/1985	8,887	1,219	0	10,106
	1/28/1988	9,305	801	0	10,106
	11/1/1990	8,743	1,363	0	10,106
	9/28/1995	9,119	987	0	10,106
	2/24/1998	8,971	1,135	0	10,106
	11/18/1999	8,853	1,253	0	10,106
	10/30/2001	8,843	1,263	0	10,106
	2/27/2002	8,894	1,212	0	10,106
	11/7/2004	8,707	1,399	0	10,106
Post Hurricane	10/25/2005	8,746	1,360	0	10,106
	10/28/2006	8,571	1,535	0	10,106
Post Hurricane	10/1/2008	8,540	1,566	0	10,106
	11/5/2009	8,986	1,120	0	10,106

	Area 3	Land	Water	Out	Total
	1/19/1985	11,892	3,676	0	15,568
	1/28/1988	12,968	2,600	0	15,568
	11/1/1990	11,230	4,338	0	15,568
	9/28/1995	9,479	6,089	0	15,568
	2/24/1998	11,745	3,823	0	15,568
	11/18/1999	10,897	4,671	0	15,568
	10/30/2001	11,307	4,261	0	15,568
	2/27/2002	11,868	3,700	0	15,568
	11/7/2004	10,899	4,669	0	15,568
Post Hurricane	10/25/2005	11,050	4,518	0	15,568
	10/28/2006	10,762	4,806	0	15,568
Post Hurricane	10/1/2008	10,667	4,901	0	15,568
	11/5/2009	10,829	4,739	0	15,568

	Area 4	Land	Water	Out	Total
	1/19/1985	1,824	753	0	2,577
	1/28/1988	2,037	540	0	2,577
	11/1/1990	1,701	876	0	2,577
	9/28/1995	1,480	1,097	0	2,577
	2/24/1998	1,784	793	0	2,577
	11/18/1999	1,672	905	0	2,577
	10/30/2001	1,757	820	0	2,577
	2/27/2002	1,841	736	0	2,577
	11/7/2004	1,647	930	0	2,577
Post Hurricane	10/25/2005	1,355	1,222	0	2,577
	10/28/2006	1,343	1,234	0	2,577
Post Hurricane	10/1/2008	1,455	1,122	0	2,577
	11/5/2009	1,431	1,146	0	2,577

Plaquemines Parish Non-Federal Levee
(NFL) Project Extended Boundaries

Data Source	Acquisition Date	Water Level Meters	Class	Area 1	Area 2	Area 3	Area 4	Total
Area Units = Acres			Out	0	0	0	0	0
TM	**1/19/1985**	1.77	TM Land	4,404	8,887	11,892	1,824	27,007
Provisional Data			TM Water	1,300	1,219	3,676	753	6,948
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**1/28/1988**	1.53	TM Land	4,532	9,305	12,968	2,037	28,842
Provisional Data			TM Water	1,172	801	2,600	540	5,113
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/1/1990**	2.00	TM Land	4,341	8,743	11,230	1,701	26,015
Provisional Data			TM Water	1,363	1,363	4,338	876	7,940
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**9/28/1995**	2.09	TM Land	5,032	9,119	9,479	1,480	25,110
Provisional Data			TM Water	672	987	6,089	1,097	8,845
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**2/24/1998**	1.72	TM Land	4,232	8,971	11,745	1,784	26,732
Provisional Data			TM Water	1,472	1,135	3,823	793	7,223
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/18/1999**	1.97	TM Land	4,816	8,853	10,897	1,672	26,238
Provisional Data			TM Water	888	1,253	4,671	905	7,717
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/30/2001**	1.97	TM Land	4,497	8,843	11,307	1,757	26,404
Provisional Data			TM Water	1,207	1,263	4,261	820	7,551
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**2/27/2002**	1.66	TM Land	4,104	8,894	11,868	1,841	26,707
Provisional Data			TM Water	1,600	1,212	3,700	736	7,248
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**11/7/2004**	1.97	TM Land	4,493	8,707	10,899	1,647	25,746
Provisional Data			TM Water	1,211	1,399	4,669	930	8,209
				5,704	**10,106**	**15,568**	**2,577**	**33,955**

			Out	0	0	0	0	0
TM	**10/25/2005**	1.86	TM Land	4,450	8,746	11,050	1,355	25,601
Provisional Data			TM Water	1,254	1,360	4,518	1,222	8,354
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/28/2006**	1.99	TM Land	4,298	8,571	10,762	1,343	24,974
Provisional Data			TM Water	1,406	1,535	4,806	1,234	8,981
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
			Out	0	0	0	0	0
TM	**10/1/2008**	2.10	TM Land	4,301	8,540	10,667	1,455	24,963
Provisional Data			TM Water	1,403	1,566	4,901	1,122	8,992
				5,704	**10,106**	**15,568**	**2,577**	**33,955**
TM + 2007 Marsh Types	**11/5/2009**	2.04	Out	0	0	0	0	0
Provisional Data			Fresh Marsh	4,664	5	0	0	4,669
NOTE: this assumes same marsh types			Intermediate Marsh	9	8,977	0	0	8,986
are present in 2009.			Brackish Marsh	0	1	10,826	1	10,828
			Saline Marsh	0	0	0	1,424	1,424
			Swamp	0	0	0	0	0
			Developed Ag Other	15	3	3	6	27
			Fresh Marsh Water	1,015	0	0	0	1,015
			Intermediate Marsh Water	0	1,120	0	0	1,120
			Brackish Marsh Water	0	0	4,738	0	4,738
			Saline Marsh Water	0	0	0	1,145	1,145
			Swamp Water	0	0	0	0	0
			Developed Ag Other Water	1	0	1	1	3
				5,704	**10,106**	**15,568**	**2,577**	**33,955**

Analysis completed 09/22/2010.

Produced for Plaquemines Parish Non-Federal Levee (NFL) Project Extended Boundaries

NOTE: Land/Water data are provisional, have not gone through a reveiw process, and can change pending the review process.

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	Total Area	Land	Water	Out	Total
	1/19/1985	27,007	6,948	0	33,955
	1/28/1988	28,842	5,113	0	33,955
	11/1/1990	26,015	7,940	0	33,955
	9/28/1995	25,110	8,845	0	33,955
	2/24/1998	26,732	7,223	0	33,955
	11/18/1999	26,238	7,717	0	33,955
	10/30/2001	26,404	7,551	0	33,955
	2/27/2002	26,707	7,248	0	33,955
	11/7/2004	25,746	8,209	0	33,955
Post Hurricane	10/25/2005	25,601	8,354	0	33,955
	10/28/2006	24,974	8,981	0	33,955
Post Hurricane	10/1/2008	24,963	8,992	0	33,955
	11/5/2009	25,934	8,021	0	33,955

	Area 1	Land	Water	Out	Total
	1/19/1985	4,404	1,300	0	5,704
	1/28/1988	4,532	1,172	0	5,704
	11/1/1990	4,341	1,363	0	5,704
	9/28/1995	5,032	672	0	5,704
	2/24/1998	4,232	1,472	0	5,704
	11/18/1999	4,816	888	0	5,704
	10/30/2001	4,497	1,207	0	5,704
	2/27/2002	4,104	1,600	0	5,704
	11/7/2004	4,493	1,211	0	5,704
Post Hurricane	10/25/2005	4,450	1,254	0	5,704
	10/28/2006	4,298	1,406	0	5,704
Post Hurricane	10/1/2008	4,301	1,403	0	5,704
	11/5/2009	4,688	1,016	0	5,704

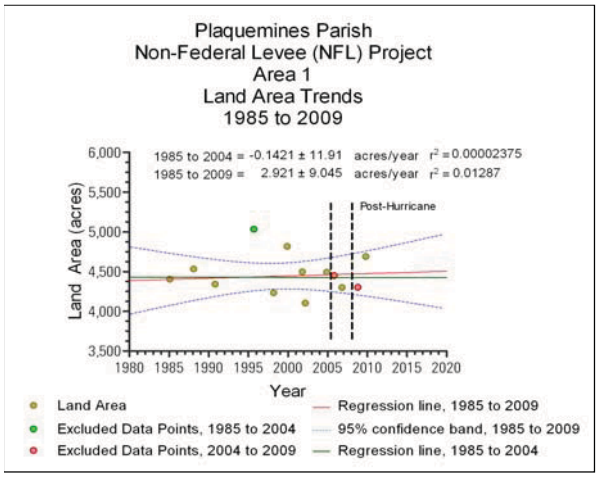
	Area 2	Land	Water	Out	Total
	1/19/1985	8,887	1,219	0	10,106
	1/28/1988	9,305	801	0	10,106
	11/1/1990	8,743	1,363	0	10,106
	9/28/1995	9,119	987	0	10,106
	2/24/1998	8,971	1,135	0	10,106
	11/18/1999	8,853	1,253	0	10,106
	10/30/2001	8,843	1,263	0	10,106
	2/27/2002	8,894	1,212	0	10,106
	11/7/2004	8,707	1,399	0	10,106
Post Hurricane	10/25/2005	8,746	1,360	0	10,106
	10/28/2006	8,571	1,535	0	10,106
Post Hurricane	10/1/2008	8,540	1,566	0	10,106
	11/5/2009	8,986	1,120	0	10,106

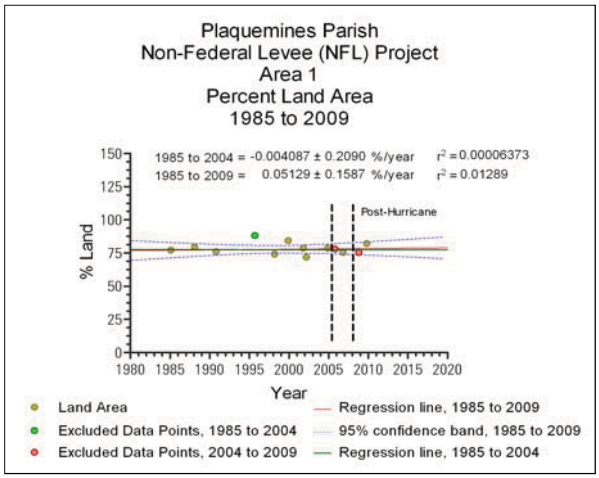
	Area 3	Land	Water	Out	Total
	1/19/1985	11,892	3,676	0	15,568
	1/28/1988	12,968	2,600	0	15,568
	11/1/1990	11,230	4,338	0	15,568
	9/28/1995	9,479	6,089	0	15,568
	2/24/1998	11,745	3,823	0	15,568
	11/18/1999	10,897	4,671	0	15,568
	10/30/2001	11,307	4,261	0	15,568
	2/27/2002	11,868	3,700	0	15,568
	11/7/2004	10,899	4,669	0	15,568
Post Hurricane	10/25/2005	11,050	4,518	0	15,568
	10/28/2006	10,762	4,806	0	15,568
Post Hurricane	10/1/2008	10,667	4,901	0	15,568
	11/5/2009	10,829	4,739	0	15,568

	Area 4	Land	Water	Out	Total
	1/19/1985	1,824	753	0	2,577
	1/28/1988	2,037	540	0	2,577
	11/1/1990	1,701	876	0	2,577
	9/28/1995	1,480	1,097	0	2,577
	2/24/1998	1,784	793	0	2,577
	11/18/1999	1,672	905	0	2,577
	10/30/2001	1,757	820	0	2,577
	2/27/2002	1,841	736	0	2,577
	11/7/2004	1,647	930	0	2,577
Post Hurricane	10/25/2005	1,355	1,222	0	2,577
	10/28/2006	1,343	1,234	0	2,577
Post Hurricane	10/1/2008	1,455	1,122	0	2,577
	11/5/2009	1,431	1,146	0	2,577

Area 1

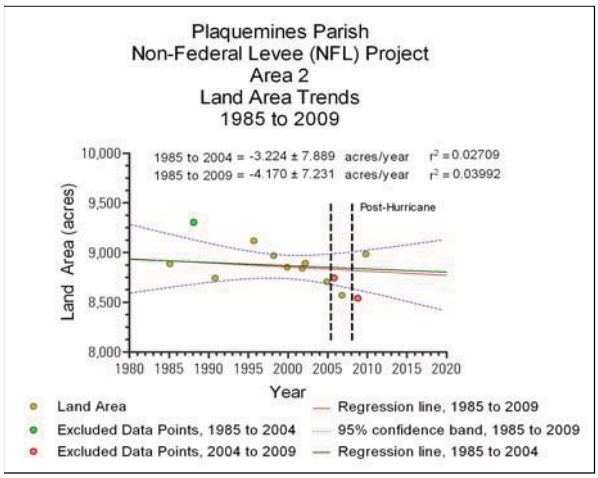
Date	Decimal Date	Data	Land Area (acres)	Water (acres)	Total (acres)	Land Area (mi2)	Water (mi2)	Total (mi2)	% Land	% Water	Daily Average, NOS #8761724 (m STND)*	Comment
1/19/1985	1985.1	TM	4404	1,300	5,704	6.9	2.0	8.9	77.2%	22.8%	1.77	
1/28/1988	1988.1	TM	4532	1,172	5,704	7.1	1.8	8.9	79.5%	20.5%	1.53	Low Water Levels
11/1/1990	1990.8	TM	4341	1,363	5,704	6.8	2.1	8.9	76.1%	23.9%	2.00	
9/28/1995	1995.7	TM	5032	672	5,704	7.9	1.1	8.9	88.2%	11.8%	2.09	High water levels, Excluded: Outlier
2/24/1998	1998.2	TM	4232	1,472	5,704	6.6	2.3	8.9	74.2%	25.8%	1.72	Low Water Levels
11/18/1999	1999.9	TM	4816	888	5,704	7.5	1.4	8.9	84.4%	15.6%	1.97	
10/30/2001	2001.8	TM	4497	1,207	5,704	7.0	1.9	8.9	78.8%	21.2%	1.97	
2/27/2002	2002.2	TM	4104	1,600	5,704	6.4	2.5	8.9	71.9%	28.1%	1.66	Low Water Levels
11/7/2004	2004.9	TM	4493	1,211	5,704	7.0	1.9	8.9	78.8%	21.2%	1.97	
10/25/2005	2005.8	TM	4450	1,254	5,704	7.0	2.0	8.9	78.0%	22.0%	1.86	
10/28/2006	2006.8	TM	4298	1,406	5,704	6.7	2.2	8.9	75.4%	24.6%	1.99	> 10kt winds N near time of image acquisition
10/1/2008	2008.8	TM	4301	1,403	5,704	6.7	2.2	8.9	75.4%	24.6%	2.10	High water levels
11/5/2009	2009.8	TM	4688	1,016	5,704	7.3	1.6	8.9	82.2%	17.8%	2.04	High water levels

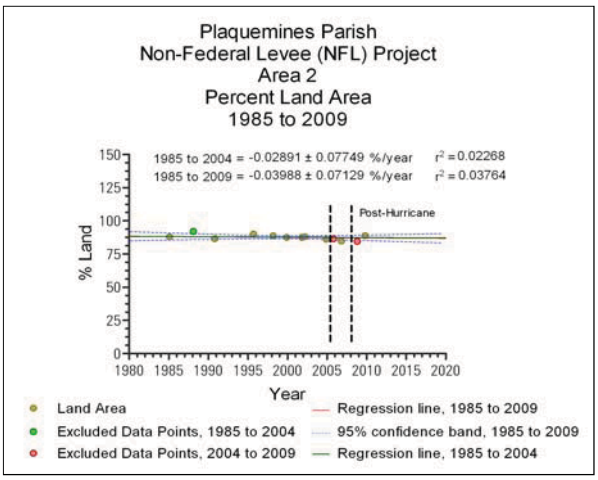




Area 2

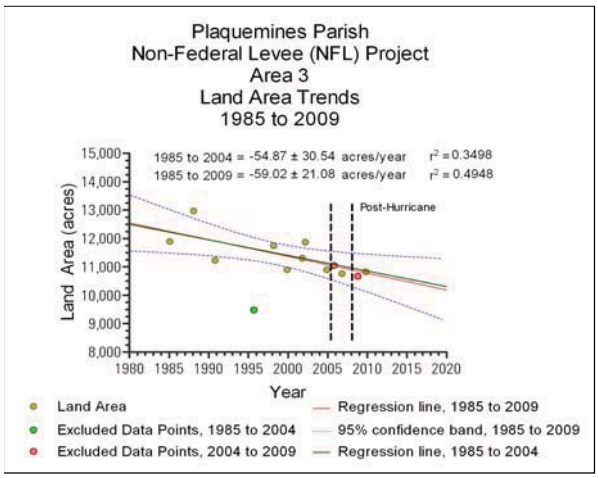
Date	Decimal Date	Data	Land Area (acres)	Water (acres)	Total (acres)	Land Area (mi2)	Water (mi2)	Total (mi2)	% Land	% Water	Daily Average, NOS #8761724 (m STND)*	Comment
1/19/1985	1985.1	TM	8887	1,219	10,106	13.9	1.9	15.8	87.9%	12.1%	1.77	
1/28/1988	1988.1	TM	9305	801	10,106	14.5	1.3	15.8	92.1%	7.9%	1.53	Low Water Levels
11/1/1990	1990.8	TM	8743	1,363	10,106	13.7	2.1	15.8	86.5%	13.5%	2.00	
9/28/1995	1995.7	TM	9119	987	10,106	14.2	1.5	15.8	90.2%	9.8%	2.09	High water levels, Excluded: Outlier
2/24/1998	1998.2	TM	8971	1,135	10,106	14.0	1.8	15.8	88.8%	11.2%	1.72	Low Water Levels
11/18/1999	1999.9	TM	8853	1,253	10,106	13.8	2.0	15.8	87.6%	12.4%	1.97	
10/30/2001	2001.8	TM	8843	1,263	10,106	13.8	2.0	15.8	87.5%	12.5%	1.97	
2/27/2002	2002.2	TM	8894	1,212	10,106	13.9	1.9	15.8	88.0%	12.0%	1.66	Low Water Levels
11/7/2004	2004.9	TM	8707	1,399	10,106	13.6	2.2	15.8	86.2%	13.8%	1.97	
10/25/2005	2005.8	TM	8746	1,360	10,106	13.7	2.1	15.8	86.5%	13.5%	1.86	
10/28/2006	2006.8	TM	8571	1,535	10,106	13.4	2.4	15.8	84.8%	15.2%	1.99	> 10kt winds N near time of image acquisition
10/1/2008	2008.8	TM	8540	1,566	10,106	13.3	2.4	15.8	84.5%	15.5%	2.10	High water levels
11/5/2009	2009.8	TM	8986	1,120	10,106	14.0	1.8	15.8	88.9%	11.1%	2.04	High water levels

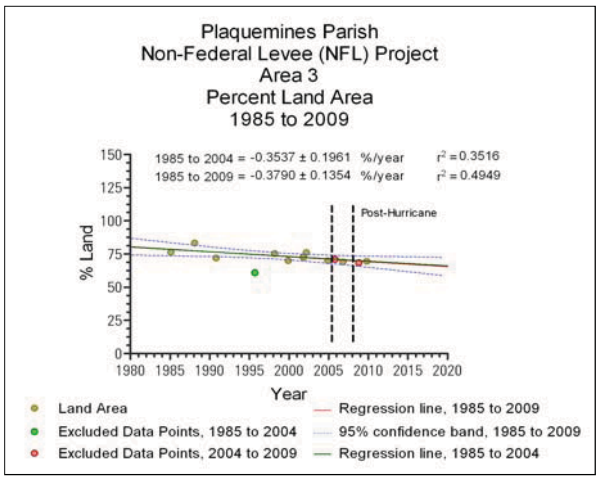




Area 3

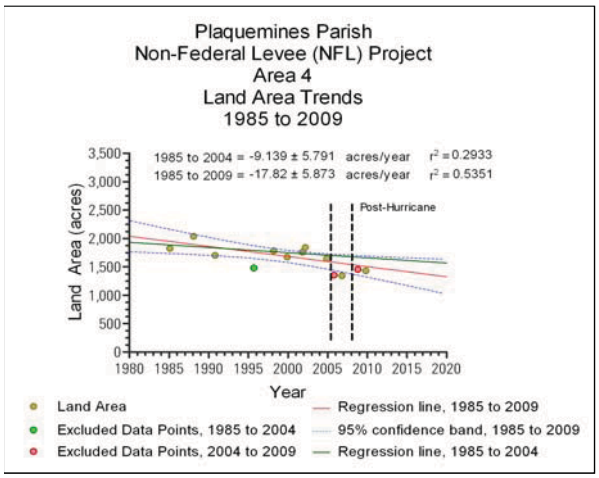
Date	Decimal Date	Data	Land Area (acres)	Water (acres)	Total (acres)	Land Area (mi2)	Water (mi2)	Total (mi2)	% Land	% Water	Daily Average, NOS #8761724 (m STND)*	Comment
1/19/1985	1985.1	TM	11892	3,676	15,568	18.6	5.7	24.3	76.4%	23.6%	1.77	
1/28/1988	1988.1	TM	12968	2,600	15,568	20.3	4.1	24.3	83.3%	16.7%	1.53	Low Water Levels
11/1/1990	1990.8	TM	11230	4,338	15,568	17.5	6.8	24.3	72.1%	27.9%	2.00	
9/28/1995	1995.7	TM	9479	6,089	15,568	14.8	9.5	24.3	60.9%	39.1%	2.09	High water levels, Excluded: Outlier
2/24/1998	1998.2	TM	11745	3,823	15,568	18.4	6.0	24.3	75.4%	24.6%	1.72	Low Water Levels
11/18/1999	1999.9	TM	10897	4,671	15,568	17.0	7.3	24.3	70.0%	30.0%	1.97	
10/30/2001	2001.8	TM	11307	4,261	15,568	17.7	6.7	24.3	72.6%	27.4%	1.97	
2/27/2002	2002.2	TM	11868	3,700	15,568	18.5	5.8	24.3	76.2%	23.8%	1.66	Low Water Levels
11/7/2004	2004.9	TM	10899	4,669	15,568	17.0	7.3	24.3	70.0%	30.0%	1.97	
10/25/2005	2005.8	TM	11050	4,518	15,568	17.3	7.1	24.3	71.0%	29.0%	1.86	
10/28/2006	2006.8	TM	10762	4,806	15,568	16.8	7.5	24.3	69.1%	30.9%	1.99	> 10kt winds N near time of image acquisition
10/1/2008	2008.8	TM	10667	4,901	15,568	16.7	7.7	24.3	68.5%	31.5%	2.10	High water levels
11/5/2009	2009.8	TM	10829	4,739	15,568	16.9	7.4	24.3	69.6%	30.4%	2.04	High water levels

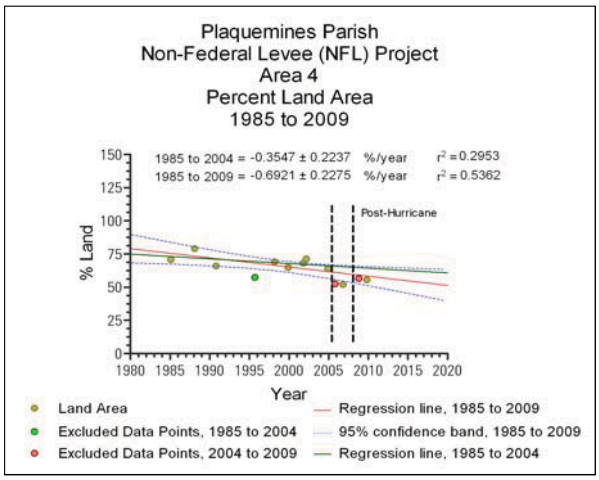




Area 4

Date	Decimal Date	Data	Land Area (acres)	Water (acres)	Total (acres)	Land Area (mi2)	Water (mi2)	Total (mi2)	% Land	% Water	Daily Average, NOS #8761724 (m STND)*	Comment
1/19/1985	1985.1	TM	1824	753	2,577	2.9	1.2	4.0	70.8%	29.2%	1.77	
1/28/1988	1988.1	TM	2037	540	2,577	3.2	0.8	4.0	79.0%	21.0%	1.53	Low Water Levels
11/1/1990	1990.8	TM	1701	876	2,577	2.7	1.4	4.0	66.0%	34.0%	2.00	
9/28/1995	1995.7	TM	1480	1,097	2,577	2.3	1.7	4.0	57.4%	42.6%	2.09	High water levels
2/24/1998	1998.2	TM	1784	793	2,577	2.8	1.2	4.0	69.2%	30.8%	1.72	Low Water Levels
11/18/1999	1999.9	TM	1672	905	2,577	2.6	1.4	4.0	64.9%	35.1%	1.97	
10/30/2001	2001.8	TM	1757	820	2,577	2.7	1.3	4.0	68.2%	31.8%	1.97	
2/27/2002	2002.2	TM	1841	736	2,577	2.9	1.2	4.0	71.4%	28.6%	1.66	Low Water Levels
11/7/2004	2004.9	TM	1647	930	2,577	2.6	1.5	4.0	63.9%	36.1%	1.97	
10/25/2005	2005.8	TM	1355	1,222	2,577	2.1	1.9	4.0	52.6%	47.4%	1.86	
10/28/2006	2006.8	TM	1343	1,234	2,577	2.1	1.9	4.0	52.1%	47.9%	1.99	> 10kt winds N near time of image acquisition
10/1/2008	2008.8	TM	1455	1,122	2,577	2.3	1.8	4.0	56.5%	43.5%	2.10	High water levels
11/5/2009	2009.8	TM	1431	1,146	2,577	2.2	1.8	4.0	55.5%	44.5%	2.04	High water levels





*Grand Isle Estimated Water Level Ranges for SE Deltaic Plain Used in TM Classification
Low = < 1.8
Moderate = 1.8 to 2.00
High = > 2.0

The water level estimates constitute a sliding range that varies with time as sea-level rise and subsidence increase water levels. The water level population is defined by the available classified TM data points.

Ex. Land-water classifications based on a "high water" Landsat TM satellite scene from 1983/84 will generally be based on a lower "high water" elevation than "high water" measurements for current scenes.

citation:

Barras, J.A., Bernier, J.C., and Morton, R.A., 2008, Land area change in coastal Louisiana--A multidecadal perspective (from 1956 to 2006): U.S. Geological Survey Scientific Investigations Map 3019, scale 1:250,000, 14 p. pamphlet, http://pubs.usgs.gov/sim/3019/

Source: John Barras

Land Loss Spreadsheet

					Loss Rate Calculation					
Project:	Plaq Parish NFL, LPP Section 1				**Beginning Year**	**Ending Year**	**Beginning Year Acreage**	**Ending Year Acreage**	**Loss Rate**	
Total Acres		**27.208**		**TY0 Water Acres**	1985	2009	4,404	4,688	0.0000	
28		27		0	FWP Land Loss Reduction			0.00		
FWOP					**FWP**					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh
0		27.21	98.83	0	0		27	99%	0	0
1	0	**27.21**	**98.83**	0	**1**	0	**0**	**0%**	28	-27
2	0	27	99%	0	2	0	0	**0%**	28	-27
3	0	27	99%	0	3	0	0	**0%**	28	-27
4	0	27	99%	0	4	0	0	**0%**	28	-27
5	0	27	99%	0	5	0	0	**0%**	28	-27
6	0	27	99%	0	6	0	0	**0%**	28	-27
7	0	27	99%	0	7	0	0	**0%**	28	-27
8	0	27	99%	0	8	0	0	**0%**	28	-27
9	0	27	99%	0	9	0	0	**0%**	28	-27
10	0	27	99%	0	10	0	0	**0%**	28	-27
11	0	27	99%	0	11	0	0	**0%**	28	-27
12	0	27	99%	0	12	0	0	**0%**	28	-27
13	0	27	99%	0	13	0	0	**0%**	28	-27
14	0	27	99%	0	14	0	0	**0%**	28	-27
15	0	27	99%	0	15	0	0	**0%**	28	-27
16	0	27	99%	0	16	0	0	**0%**	28	-27
17	0	27	99%	0	17	0	0	**0%**	28	-27
18	0	27	99%	0	18	0	0	**0%**	28	-27
19	0	27	99%	0	19	0	0	**0%**	28	-27
20	0	**27**	**99%**	0	**20**	0	**0**	**0%**	28	**-27**
21	0	27	99%	0	21	0	0	**0%**	28	-27
22	0	27	99%	0	22	0	0	**0%**	28	-27
23	0	27	99%	0	23	0	0	**0%**	28	-27
24	0	27	99%	0	24	0	0	**0%**	28	-27
25	0	27	99%	0	25	0	0	**0%**	28	-27
26	0	27	99%	0	26	0	0	**0%**	28	-27
27	0	27	99%	0	27	0	0	**0%**	28	-27
28	0	27	99%	0	28	0	0	**0%**	28	-27
29	0	27	99%	0	29	0	0	**0%**	28	-27
30	0	27	99%	0	30	0	0	**0%**	28	-27
31	0	27	99%	0	31	0	0	**0%**	28	-27
32	0	27	99%	0	32	0	0	**0%**	28	-27
33	0	27	99%	0	33	0	0	**0%**	28	-27
34	0	27	99%	0	34	0	0	**0%**	28	-27
35	0	27	99%	0	35	0	0	**0%**	28	-27
36	0	27	99%	0	36	0	0	**0%**	28	-27
37	0	27	99%	0	37	0	0	**0%**	28	-27
38	0	27	99%	0	38	0	0	**0%**	28	-27
39	0	27	99%	0	39	0	0	**0%**	28	-27
40	0	27	99%	0	40	0	0	**0%**	28	-27
41	0	27	99%	0	41	0	0	**0%**	28	-27
42	0	27	99%	0	42	0	0	**0%**	28	-27
43	0	27	99%	0	43	0	0	**0%**	28	-27
44	0	27	99%	0	44	0	0	**0%**	28	-27
45	0	27	99%	0	45	0	0	**0%**	28	-27
46	0	27	99%	0	46	0	0	**0%**	28	-27
47	0	27	99%	0	47	0	0	**0%**	28	-27
48	0	27	99%	0	48	0	0	**0%**	28	-27
49	0	27	99%	0	49	0	0	**0%**	28	-27
50	0	27.21	98.83	0	50	0	0	**0%**	28	-27

Land Loss Spreadsheet

Project:	Plaq Parish NFL, Alt 2 (2%) Section 1				Loss Rate Calculation				
					Beginning Year	Ending Year	Beginning Year Acreage	Ending Year Acreage	Loss Rate
Total Acres		TY0 Marsh Acres		TY0 Water Acres	1985	2009	4,404	4,688	0.0000
10		10		0	FWP Land Loss Reduction			0.00	

FWOP					FWP					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh
0		10.36	99.37%	0	0		10	99%	0	0
1	0	**10.36**	**99.37%**	0	**1**	0	**0**	**0%**	10	-10
2	0	10	99%	0	2	0	0	**0%**	10	-10
3	0	10	99%	0	3	0	0	**0%**	10	-10
4	0	10	99%	0	4	0	0	**0%**	10	-10
5	0	10	99%	0	5	0	0	**0%**	10	-10
6	0	10	99%	0	6	0	0	**0%**	10	-10
7	0	10	99%	0	7	0	0	**0%**	10	-10
8	0	10	99%	0	8	0	0	**0%**	10	-10
9	0	10	99%	0	9	0	0	**0%**	10	-10
10	0	10	99%	0	10	0	0	**0%**	10	-10
11	0	10	99%	0	11	0	0	**0%**	10	-10
12	0	10	99%	0	12	0	0	**0%**	10	-10
13	0	10	99%	0	13	0	0	**0%**	10	-10
14	0	10	99%	0	14	0	0	**0%**	10	-10
15	0	10	99%	0	15	0	0	**0%**	10	-10
16	0	10	99%	0	16	0	0	**0%**	10	-10
17	0	10	99%	0	17	0	0	**0%**	10	-10
18	0	10	99%	0	18	0	0	**0%**	10	-10
19	0	10	99%	0	19	0	0	**0%**	10	-10
20	0	**10**	**99%**	0	**20**	0	**0**	**0%**	10	**-10**
21	0	10	99%	0	21	0	0	**0%**	10	-10
22	0	10	99%	0	22	0	0	**0%**	10	-10
23	0	10	99%	0	23	0	0	**0%**	10	-10
24	0	10	99%	0	24	0	0	**0%**	10	-10
25	0	10	99%	0	25	0	0	**0%**	10	-10
26	0	10	99%	0	26	0	0	**0%**	10	-10
27	0	10	99%	0	27	0	0	**0%**	10	-10
28	0	10	99%	0	28	0	0	**0%**	10	-10
29	0	10	99%	0	29	0	0	**0%**	10	-10
30	0	10	99%	0	30	0	0	**0%**	10	-10
31	0	10	99%	0	31	0	0	**0%**	10	-10
32	0	10	99%	0	32	0	0	**0%**	10	-10
33	0	10	99%	0	33	0	0	**0%**	10	-10
34	0	10	99%	0	34	0	0	**0%**	10	-10
35	0	10	99%	0	35	0	0	**0%**	10	-10
36	0	10	99%	0	36	0	0	**0%**	10	-10
37	0	10	99%	0	37	0	0	**0%**	10	-10
38	0	10	99%	0	38	0	0	**0%**	10	-10
39	0	10	99%	0	39	0	0	**0%**	10	-10
40	0	10	99%	0	40	0	0	**0%**	10	-10
41	0	10	99%	0	41	0	0	**0%**	10	-10
42	0	10	99%	0	42	0	0	**0%**	10	-10
43	0	10	99%	0	43	0	0	**0%**	10	-10
44	0	10	99%	0	44	0	0	**0%**	10	-10
45	0	10	99%	0	45	0	0	**0%**	10	-10
46	0	10	99%	0	46	0	0	**0%**	10	-10
47	0	10	99%	0	47	0	0	**0%**	10	-10
48	0	10	99%	0	48	0	0	**0%**	10	-10
49	0	10	99%	0	49	0	0	**0%**	10	-10
50	0	10.36	99.37%	0	50	0	0	**0%**	10	-10

Land Loss Spreadsheet

Project:	Plaq Parish NFL, 2%/LPP Section 4				Loss Rate Calculation				
					Beginning Year	Ending Year	Beginning Year Acreage	Ending Year Acreage	Loss Rate
Total Acres		TY0 Marsh Acres		TY0 Water Acres	1985	2009	11,892	10,829	-0.0037
15		11		4	FWP Land Loss Reduction			0.00	

FWOP					FWP					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh
0		10.89	73.04%	4	0		11	73%	4	0
1	-0.003724	**10.85**	**72.77%**	4	**1**	-0.003724	**0**	**0%**	15	-11
2	-0.003724	11	72%	4	2	-0.003724	0	**0%**	15	-11
3	-0.003724	11	72%	4	3	-0.003724	0	**0%**	15	-11
4	-0.003724	11	72%	4	4	-0.003724	0	**0%**	15	-11
5	-0.003724	11	72%	4	5	-0.003724	0	**0%**	15	-11
6	-0.003724	11	71%	4	6	-0.003724	0	**0%**	15	-11
7	-0.003724	11	71%	4	7	-0.003724	0	**0%**	15	-11
8	-0.003724	11	71%	4	8	-0.003724	0	**0%**	15	-11
9	-0.003724	11	71%	4	9	-0.003724	0	**0%**	15	-11
10	-0.003724	10	70%	4	10	-0.003724	0	**0%**	15	-10
11	-0.003724	10	70%	4	11	-0.003724	0	**0%**	15	-10
12	-0.003724	10	70%	4	12	-0.003724	0	**0%**	15	-10
13	-0.003724	10	70%	5	13	-0.003724	0	**0%**	15	-10
14	-0.003724	10	69%	5	14	-0.003724	0	**0%**	15	-10
15	-0.003724	10	69%	5	15	-0.003724	0	**0%**	15	-10
16	-0.003724	10	69%	5	16	-0.003724	0	**0%**	15	-10
17	-0.003724	10	69%	5	17	-0.003724	0	**0%**	15	-10
18	-0.003724	10	68%	5	18	-0.003724	0	**0%**	15	-10
19	-0.003724	10	68%	5	19	-0.003724	0	**0%**	15	-10
20	-0.003724	**10.11**	**67.79%**	5	**20**	-0.003724	**0**	**0%**	15	**-10**
21	-0.003724	10	68%	5	21	-0.003724	0	**0%**	15	-10
22	-0.003724	10	67%	5	22	-0.003724	0	**0%**	15	-10
23	-0.003724	10	67%	5	23	-0.003724	0	**0%**	15	-10
24	-0.003724	10	67%	5	24	-0.003724	0	**0%**	15	-10
25	-0.003724	10	67%	5	25	-0.003724	0	**0%**	15	-10
26	-0.003724	10	66%	5	26	-0.003724	0	**0%**	15	-10
27	-0.003724	10	66%	5	27	-0.003724	0	**0%**	15	-10
28	-0.003724	10	66%	5	28	-0.003724	0	**0%**	15	-10
29	-0.003724	10	66%	5	29	-0.003724	0	**0%**	15	-10
30	-0.003724	10	65%	5	30	-0.003724	0	**0%**	15	-10
31	-0.003724	10	65%	5	31	-0.003724	0	**0%**	15	-10
32	-0.003724	10	65%	5	32	-0.003724	0	**0%**	15	-10
33	-0.003724	10	65%	5	33	-0.003724	0	**0%**	15	-10
34	-0.003724	10	64%	5	34	-0.003724	0	**0%**	15	-10
35	-0.003724	10	64%	5	35	-0.003724	0	**0%**	15	-10
36	-0.003724	10	64%	5	36	-0.003724	0	**0%**	15	-10
37	-0.003724	9	64%	5	37	-0.003724	0	**0%**	15	-9
38	-0.003724	9	63%	5	38	-0.003724	0	**0%**	15	-9
39	-0.003724	9	63%	5	39	-0.003724	0	**0%**	15	-9
40	-0.003724	9	63%	6	40	-0.003724	0	**0%**	15	-9
41	-0.003724	9	63%	6	41	-0.003724	0	**0%**	15	-9
42	-0.003724	9	62%	6	42	-0.003724	0	**0%**	15	-9
43	-0.003724	9	62%	6	43	-0.003724	0	**0%**	15	-9
44	-0.003724	9	62%	6	44	-0.003724	0	**0%**	15	-9
45	-0.003724	9	62%	6	45	-0.003724	0	**0%**	15	-9
46	-0.003724	9	62%	6	46	-0.003724	0	**0%**	15	-9
47	-0.003724	9	61%	6	47	-0.003724	0	**0%**	15	-9
48	-0.003724	9	61%	6	48	-0.003724	0	**0%**	15	-9
49	-0.003724	9	61%	6	49	-0.003724	0	**0%**	15	-9
50	-0.003724	9.04	60.61%	6	50	-0.003724	0	**0%**	15	-9

Land Loss Spreadsheet

Project:	Plaq Parish NFL, 2%/LPP Section 5				Loss Rate Calculation				
					Beginning Year	Ending Year	Beginning Year Acreage	Ending Year Acreage	Loss Rate
Total Acres		TY0 Marsh Acres		TY0 Water Acres	1985	2009	1,824	1,431	-0.0090
6		5		1	FWP Land Loss Reduction			0.00	

FWOP					FWP					
TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	TY	Loss Rate	Marsh (acres)	% Marsh (V1)	Water (acres)	Net Acres of Marsh
0		5.26	85.39%	1	0		5	85%	1	0
1	-0.008978	**5.21**	**84.62%**	1	**1**	-0.008978	**0**	**0%**	6	-5
2	-0.008978	5	84%	1	2	-0.008978	0	**0%**	6	-5
3	-0.008978	5	83%	1	3	-0.008978	0	**0%**	6	-5
4	-0.008978	5	82%	1	4	-0.008978	0	**0%**	6	-5
5	-0.008978	5	82%	1	5	-0.008978	0	**0%**	6	-5
6	-0.008978	5	81%	1	6	-0.008978	0	**0%**	6	-5
7	-0.008978	5	80%	1	7	-0.008978	0	**0%**	6	-5
8	-0.008978	5	79%	1	8	-0.008978	0	**0%**	6	-5
9	-0.008978	5	79%	1	9	-0.008978	0	**0%**	6	-5
10	-0.008978	5	78%	1	10	-0.008978	0	**0%**	6	-5
11	-0.008978	5	77%	1	11	-0.008978	0	**0%**	6	-5
12	-0.008978	5	77%	1	12	-0.008978	0	**0%**	6	-5
13	-0.008978	5	76%	1	13	-0.008978	0	**0%**	6	-5
14	-0.008978	5	75%	2	14	-0.008978	0	**0%**	6	-5
15	-0.008978	5	75%	2	15	-0.008978	0	**0%**	6	-5
16	-0.008978	5	74%	2	16	-0.008978	0	**0%**	6	-5
17	-0.008978	5	73%	2	17	-0.008978	0	**0%**	6	-5
18	-0.008978	4	73%	2	18	-0.008978	0	**0%**	6	-4
19	-0.008978	4	72%	2	19	-0.008978	0	**0%**	6	-4
20	-0.008978	**4**	**71%**	2	**20**	-0.008978	**0**	**0%**	6	**-4**
21	-0.008978	4	71%	2	21	-0.008978	0	**0%**	6	-4
22	-0.008978	4	70%	2	22	-0.008978	0	**0%**	6	-4
23	-0.008978	4	69%	2	23	-0.008978	0	**0%**	6	-4
24	-0.008978	4	69%	2	24	-0.008978	0	**0%**	6	-4
25	-0.008978	4	68%	2	25	-0.008978	0	**0%**	6	-4
26	-0.008978	4	68%	2	26	-0.008978	0	**0%**	6	-4
27	-0.008978	4	67%	2	27	-0.008978	0	**0%**	6	-4
28	-0.008978	4	66%	2	28	-0.008978	0	**0%**	6	-4
29	-0.008978	4	66%	2	29	-0.008978	0	**0%**	6	-4
30	-0.008978	4	65%	2	30	-0.008978	0	**0%**	6	-4
31	-0.008978	4	65%	2	31	-0.008978	0	**0%**	6	-4
32	-0.008978	4	64%	2	32	-0.008978	0	**0%**	6	-4
33	-0.008978	4	63%	2	33	-0.008978	0	**0%**	6	-4
34	-0.008978	4	63%	2	34	-0.008978	0	**0%**	6	-4
35	-0.008978	4	62%	2	35	-0.008978	0	**0%**	6	-4
36	-0.008978	4	62%	2	36	-0.008978	0	**0%**	6	-4
37	-0.008978	4	61%	2	37	-0.008978	0	**0%**	6	-4
38	-0.008978	4	61%	2	38	-0.008978	0	**0%**	6	-4
39	-0.008978	4	60%	2	39	-0.008978	0	**0%**	6	-4
40	-0.008978	4	60%	2	40	-0.008978	0	**0%**	6	-4
41	-0.008978	4	59%	3	41	-0.008978	0	**0%**	6	-4
42	-0.008978	4	58%	3	42	-0.008978	0	**0%**	6	-4
43	-0.008978	4	58%	3	43	-0.008978	0	**0%**	6	-4
44	-0.008978	4	57%	3	44	-0.008978	0	**0%**	6	-4
45	-0.008978	4	57%	3	45	-0.008978	0	**0%**	6	-4
46	-0.008978	3	56%	3	46	-0.008978	0	**0%**	6	-3
47	-0.008978	3	56%	3	47	-0.008978	0	**0%**	6	-3
48	-0.008978	3	55%	3	48	-0.008978	0	**0%**	6	-3
49	-0.008978	3	55%	3	49	-0.008978	0	**0%**	6	-3
50	-0.008978	3.35	54.40%	3	50	-0.008978	0	**0%**	6	-3

APPENDIX F
SECTION 404(B)(1) EVALUATION

DRAFT ENVIRONMENTAL IMPACT STATEMENT
NEW ORLEANS TO VENICE (NOV), LOUISIANA,
HURRICANE PROTECTION PROJECT:
INCORPORATION OF NON-FEDERAL LEVEES (NFL) FROM OAKVILLE TO VENICE
ST. JUDE, PLAQUEMINES PARISH, LOUISIANA

APPENDIX F
SECTION 404(b)(1) EVALUATION

INTRODUCTION

1. As required by Section 404(b)(1) of the Clean Water Act, this evaluation assesses 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.

PROJECT DESCRIPTION

LOCATION

2. The project is located on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, between Oakville and St. Jude. 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 the Federal 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 non-Federal levee 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.

GENERAL DESCRIPTION OF PROJECT PLAN

3. The project plan proposes to upgrade and incorporate 32 miles of existing non-Federal back levees on the west bank of the Mississippi River in Plaquemines Parish between the communities of Oakville and St. Jude into the Federal levee system and construct from ground level 2 miles of earthen back levees. The levee upgrade can be divided into five reaches.

a. Section 1 – Oakville to La Reussite. This section starts at the beginning of the project limit at 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 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.

b. 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.

c. 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.

d. 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.

e. 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 approximately 2 miles.

4. The levees would be raised to an authorized elevation of 12.0 feet. The NFL would be incorporated into the existing NOV Hurricane Protection project. The northern terminus of the existing NFL at Oakville would be tied into the proposed west bank and vicinity Hurricane Protection project alignment on the south side of Oakville. The tie-in point is located on the west side of LA-23 at the proposed Hero Canal Levee and eastern terminus of the west bank and vicinity. The southern terminus of the NFL near St. Jude would tie into the existing St. Jude to City Price back levee of the NOV Hurricane Protection project.

PURPOSE AND AUTHORITY

5. The proposed project would provide improved storm surge protection and protect hurricane evacuation route LA-23 to a higher level from potential flooding in the event of a storm or hurricane.

6. Congress and the Administration granted a series of supplemental appropriations acts following Hurricanes Katrina and Rita to repair and upgrade existing hurricane storm damage risk reduction systems in southeastern Louisiana damaged by the storms. Authorities for the proposed action are described below.

a. 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 improved storm surge protection and protection of the evacuation route.

b. 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; . . . .''

c. 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. . . ."

d. 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; . . . ."

e. On April 14, 2010, the CEMVN Commander provided Design Direction guidance to the Project Delivery Team (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 alignment. The reconsideration process culminated in a joint decision briefing on July 6, 2010, between the CEMVN Commander and the CEMVK Commander (represented by CEMVK Deputy Commander) and CEMVK and CEMVN staff, resulting in a Memorandum for Record (MFR) dated July 14, 2010.

GENERAL DESCRIPTION OF DREDGED OR FILL MATERIAL

General Characteristics of Material

7. Fill material used in the levee upgrade construction would predominantly consist of clays from borrow areas interbedded with layers of silts and sands.

Quantity of Material

8. Approximately 29,048,000 million cubic yards of noncompacted clay would be required to upgrade the entire non-Federal levee system. The fill material requirements by section are Section 1 - 2,600,000 cubic yards; Section 2 – 11,360,000; and Sections 3 to 5 – 15,088,000 cubic yards.

Source of Material

9. The delivery of borrow for the project will be accomplished through a combination of Government Furnished and Contractor Furnished borrow. A contract-by-contract borrow analysis will be completed for each project increment. All borrow would be from Government approved borrow areas.

DISCRIPTION OF THE PROPOSED DISCHARGE SITES

Location

10. The discharge of fill material would be at levee upgrade construction sites.

Size

11. The project encompasses the 32-mile NFL footprint. Wetland acreages impacted by the proposed construction would total approximately 342 acres.

Types of Sites

12. Sites are located on both cleared and uncleared acreages. Discharge sites would include the footprints of levees as well as borrow areas.

Types of Habitat

13. Habitat types include forested, marsh, openland/pasture, and scrub-shrub lands. Table 1 displays wetland impacted acreage by habitat type.

TABLE F-1
WETLAND ACREAGE IMPACTED BY TYPE

Habitat Type	Acreage
Bottom-land Hardwood Wet	124.6
Bottom-land Hardwood Dry	17.7
Wet Pasture	146.9
Swamp	24.9
Scrub Shrub	1.4
Intermediate Marsh	0.1
Freshwater Marsh	10.4
Brackish Marsh	16.1

Timing and Duration of Discharge

14. Discharge timing would depend on preconstruction planning and construction activities. Presently, construction is scheduled to begin in late 2011, and the capability exists to complete construction in January 2013.

DESCRIPTION OF DISPOSAL METHOD

15. The major portion of borrow material would be utilized in upgrading levees as noted in paragraphs 4 and 5 of this appendix. To the extent practicable, efforts would be made to avoid and minimize adverse impacts to wetland areas. Contractors would be responsible for providing clean fill material for deposition.

FACTUAL DETERMINATIONS

PHYSICAL SUBSTRATE DETERMINATIONS

Substrate Elevation and Slope

16. The mainline flood control levees in the lower Mississippi Valley are founded on the quaternary alluvium of the Mississippi River system. The flood plain has a typical downstream slope of 0.6 per mile.

Sediment Type

17. Soils would primarily be comprised of clay, silt, and sand materials.

Dredged/Fill Material Movement

18. Any movement of fill material would be insignificant. Disturbed areas would be revegetated as soon as possible following construction. No open water discharges which would be subject to current or wave action are expected.

Physical Effects on Benthos

19. Deposition of fill material into wetland areas would occur during excavation and placement of fill material for levee upgrade construction. Benthic organisms adjacent to these sites would be affected by construction operations. However, these organisms would be expected to recolonize after borrow operations have been completed. In addition, benthic organisms would establish in any newly constructed borrow area created by the project.

Actions Taken to Minimize Impacts

20. Disturbed areas would be revegetated as soon as practical. Materials to be discharged are similar to the substrate at discharge sites. Wetlands and other waters have been avoided to the extent practicable in the design of the project. Additionally, best management practices (BMP silt fences and hay bales) would be used to reduce suspended solids from runoff. Turbidity screens or silt curtains placed in water around construction sites would reduce the spread of waters with elevated concentrations of suspended solids. 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.

WATER CIRCULATION, FLUCTUATION, CHEMICAL, AND PHYSICAL DETERMINATIONS

Water

21. Water quality impacts resulting from project construction would primarily be short term and localized. Excavation operations conducted in borrow areas would result in localized increases in turbidity and suspended solids adjacent to excavation operations. Increased turbidity and suspended solids levels would be expected to return to preconstruction levels soon after excavation operations are complete. The impacts to water quality at discharge sites are expected to be insignificant since most work would occur in the dry.

22. Water quality within newly constructed borrow areas would be affected by the soil concentrations of the surrounding area and from the flushing effects from seasonal high-water fluctuations on the Mississippi River. Landside borrow areas would be affected by residual soil nutrient and pesticide loadings. Landside borrow areas would not experience flushing effects from seasonal high-water fluctuations on the Mississippi River.

a. Salinity. No impacts to existing salinity conditions are anticipated.

b. Water Chemistry. Excavation and fill operations associated with this project are not anticipated to alter water chemistry of existing borrow areas or the Mississippi River significantly. Newly constructed borrow areas would be affected by surrounding soil conditions. After new borrow areas become established and an equilibrium condition is reached, the water quality of the newly constructed borrow areas is anticipated to be similar to existing borrow areas.

c. Clarity. Increased turbidity and suspended solids would reduce the clarity of any surface water in the immediate vicinity of fill material placement. This would be a temporary and localized condition. Clarity would return to preexisting conditions shortly after construction activities cease.

d. Color. Any changes in color would be temporary and minor.

e. Odor. Construction activities would result in the release of odors otherwise contained. However, this condition is not expected to be hazardous and would be localized and short lived.

f. Taste. No potable water intakes are known to exist in the immediate vicinity of proposed discharge/fill sites.

g. Dissolved gas levels. Excavation from existing borrow areas would result in decreases in dissolved oxygen as a direct response to increases in suspended solids and turbidities. Dissolved oxygen levels would return to preconstruction levels following completion of excavation activities.

h. Nutrients. The surface waters and sediments within existing borrow areas are rich in nutrients, especially nitrogen and phosphorous. Sediment disturbance during construction would cause temporary increases in nutrient levels. However, such increases would be of short duration and nutrient levels would return to preconstruction levels following completion of proposed construction activities.

i. Eutrophication. Some short-term localized increases in turbidity, sedimentation, and nutrient levels would occur during the discharge of fill material. However, net increases nor decreases in nutrient loadings are anticipated due to project construction. No significant changes in the eutrophic state are anticipated.

j. Current pattern and circulation. No effect.

k. Velocity. No effect.

l. Stratification. Existing borrow areas that have their size increased may be impacted with regards to stratification. Short-term increases in turbidity are likely to occur during excavation and filling operations. This may affect water temperatures near construction areas. Since stratification is primarily dependent on temperature, short-term impacts in stratification are likely to occur during excavation and filling operations. Any impacts resulting in a change in stratification processes would be minor and temporary.

m. Hydrologic regime. The hydrologic regime would not be significantly impacted as a result of project construction. The addition of new borrow areas and/or increasing existing borrow areas would provide additional water storage. The levee upgrade would result in the filling of some wetland areas which would result in a reduction of water storage. No changes in existing drainage patterns which would result in a change in the hydrologic regime of the project area anticipated.

n. Normal water level fluctuation. Normal water level fluctuations are influenced primarily by states on the Mississippi River. Since project construction would not affect river stages, no impacts to normal water level fluctuations are anticipated.

o. Salinity gradients. No effect.

Actions Taken to Minimize Impacts

23. The adverse impacts to water quality associated with removal of vegetation would be minimized by seeding disturbed areas after construction. Storm-water runoff measures will be implemented in accordance with State of Louisiana laws and regulations.

SUSPENDED PARTICULATE/
TURBIDITY DETERMINATIONS

24. The temporary effects of clearing, filling, and excavation associated with the proposed project construction would be increases in soil erosion and/or turbidity. Eroded material from areas excavated for borrow may be transported into nearby drainage ways resulting in short-term and localized increases in suspended particulates and turbidity levels.

a. Light penetration. Short-term reductions in light penetration are likely to occur during excavation of existing borrow areas and construction within wetland areas. These reductions in light penetration are anticipated to be short term and localized to the area adjacent to construction operations.

b. Dissolved oxygen (DO). Borrow excavation in existing borrow areas and/or wetlands would cause increases in suspended solids and turbidity resulting in localized decreases in DO. However, decreases in DO are not expected to fall below state minimum standards.

c. Toxic metals and organisms. There is the possibility of some mobilization of metal and/or organic contaminants into the water column during borrow excavation. However, the expected potential impact of such mobilization would be minor.

d. Pathogens. While coliform and enterococci bacteria may be present in project waters, project construction would not affect this condition.

e. Esthetics. Area esthetics would be temporarily degraded during the construction phase of the proposed project. However, the upgraded levees and other appropriate areas would be reseeded and would resemble the existing landscape in time.

f. Pesticides. The nonpoint source of runoff from surrounding areas is the primary source of pesticides in the drainage area. Project construction would not significantly affect this.

g. Effects on biota. Periodic reductions in light transmissions as a result of erosion association with construction would reduce photosynthesis and primary production to a minor degree in portions of aquatic areas.

h. Suspension/filter feeders. Larval and juvenile forms of suspension and filter feeding organisms would be adversely affected on a localized basis.

i. Sight feeders. No significant effects. These organisms are generally highly mobile and would avoid or escape areas of high turbidity during excavation in existing borrow areas.

j. Actions taken to minimize impacts. Disturbed areas would be revegetated as soon as possible following construction.

CONTAMINATION DETERMINATIONS

25. Based on the water quality information documented in Appendix H and this evaluation, the risk of contamination of waters resulting from the placement of borrow/fill material into waters located within the project area is low. Excavation and filling operations associated with this project are not expected to significantly affect the water chemistry of waters within the project area.

AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS

Effects on Plankton

26. Any existing plankton in the immediate area of excavation and fill operation would be adversely impacted due to elevated turbidity levels. The impacts would be localized and short term. Waters and/or wetlands filled by levee upgrade construction would, unavoidably, no longer be available for use by plankton.

Effects on Benthos

27. Some benthic organisms would be adversely impacted by deposition of fill material. Waters and wetlands filled during construction would, unavoidably, no longer be available for use by benthic organisms.

Effects on Nekton

28. Waters and wetlands filled during construction would, unavoidably, no longer be available for use by nekton.

Effects on Aquatic Food Web

29. The aquatic food web would, unavoidably, be adversely impacted due to the loss of approximately 342.1 acres of various wetland types.

Effects on Special Aquatic Sites

30. The Mississippi River along with associated wetlands and marsh habitat comprise the major aquatic resource in the project area. Any project-induced impacts (e.g., erosion during construction) would be minor and temporary.

a. Wetlands. The project would have direct impact to wetlands (See draft EIS Table 6-7).

b. Mudflats. Not applicable.

c. Vegetated shallows. Not applicable.

d. Coral reefs. Not applicable.

e. Riffle and pool complexes. Not applicable.

f. Threatened and endangered species. No effect.

g. Other wildlife. Wildlife wetland habitat and associated wildlife would experience unavoidable adverse impacts due to the loss of this habitat.

h. Actions to minimize impacts. Environmental design measures (e.g., following the protected levee side) to the extent practicable and planned mitigation. Unavoidable adverse effects to wetlands would be offset through mitigation concurrent with project construction.

PROPOSED DISPOSAL SITE DETERMINATIONS

Mixing Zone Determinations

31. No water quality criteria should be exceeded by the discharges.

Determinations of Compliance with Applicable Water Quality Standards

32. Only temporary short-term impacts to water quality are anticipated as a direct result of project construction. These impacts include temporary increases in suspended solids and increases in turbidity levels which would occur during construction.

Potential Effects on Human Use Characteristics

33. Municipal and private water supply. No effects.

34. Recreational and commercial fisheries. Excavation of borrow areas would provide limited additional opportunities for fishing.

35. Water-related recreation. Any recreational activities would be temporarily curtailed within the construction area.

Determination of Cumulative Effects on the Aquatic Ecosystem

36. The requirement for the deposition of fill material during construction would 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.

Determination of Secondary
Effects on the Aquatic Ecosystem

37. Secondary impacts on the ecosystem would be minimal.

FINDING OF COMPLIANCE FOR FLOOD CONTROL

38. No significant adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.

39. Deposition of fill material associated with construction requirements for the NOV non-Federal Hurricane Protection project would adversely impact 124.6 acres of bottom hardwoods (dry), 17.7 acres of bottom-land hardwoods (wet), 146.9 acres of wet pasture, 24.9 acres of swamp, 1.4 acres of scrub shrub, 0.1 acre of intermediate marsh, 10.4 acres of freshwater marsh, and 16.1 acres of brackish marsh. 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 would be fully compensated.

40. The planned deposition of fill material would not violate applicable State Water Quality Standards. Further, the planned fill action would not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

41. No endangered species or their critical habitat will be adversely impacted by the planned action.

42. The proposed deposition of fill material would not result in unacceptable adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Further, the proposed discharges would not result in unacceptable adverse effects on the life stages of aquatic or semiaquatic organisms, the aquatic ecosystem, diversity, productivity, stability, recreation and esthetic resources, and economic values.

43. Appropriate steps to minimize potential adverse impacts of the fill action on aquatic systems include cessation of fill activities during extreme flood events and avoidance of discharges into open water where possible.

44. On the basis of the Section 404(b)(1) guidelines, the proposed sites for the deposition of fill material are specified as complying with the requirements of these guidelines.

APPENDIX G
STATE HISTORIC PRESERVATION OFFICER AND TRIBAL COORDINATION

ALABAMA-COUSHATTA TRIBE OF TEXAS
571 State Park Rd 56 • Livingston, Texas 77351 • (936) 563-1100

May 4, 2010

Paul Hughbanks
New Orleans District, Corps of Engineers
Attn: CEMVN-PM-R
P.O. Box 60267
New Orleans, LA 70160-0267

Dear Dr. Hughbanks:

On behalf of Mikko Oscola Clayton Sylestine and the Alabama-Coushatta Tribe, our appreciation is expressed on your efforts to consult us regarding the Non-Federal Levees Project, West Bank of the Mississippi River in Plaquemines Parish.

Our Tribe maintains ancestral associations within Louisiana despite the absence of written records to completely identify Tribal activities, villages, trails, or grave sites. However, it is our objective to ensure significances of Native American ancestry, especially of the Alabama-Coushatta Tribe, are administered with the utmost attention.

Upon review of your April 13, 2010 submission, no impacts to religious, cultural, or historical assets of the Alabama-Coushatta Tribe of Texas should occur in conjunction with this proposal. Therefore, we concur with your "no adverse effect" recommendation.

In the event of inadvertent discovery of human remains, activity in proximity to the location must cease and appropriate authorities, including our office, notified without delay. Should you require additional assistance, please do not hesitate to contact us.

Respectfully submitted,

Bryant J. Celestine
Historic Preservation Officer

Telephone: 936 – 563 – 1181 celestine.bryant@actribe.org Fax: 936 – 563 – 1183

MITCHELL J. LANDRIEU
LIEUTENANT GOVERNOR

State of Louisiana

OFFICE OF THE LIEUTENANT GOVERNOR
DEPARTMENT OF CULTURE, RECREATION & TOURISM
OFFICE OF THE SECRETARY

PAM BREAUX
SECRETARY

May 11, 2010

Ms. Joan Exnicios
Environmental Planning and Compliance Branch
New Orleans District, Corps of Engineers
P.O. Box 60267
New Orleans, LA 70160-0267

Re: Draft Phase I/Phase II CRM Report
LA Division of Archaeology Report No. 22-3459
Cultural Resource Investigation[s] for the
Non-Federal Levees Project,
West Bank of the Mississippi River,
Plaquemines Parish, Louisiana
URS-Baton Rouge

Dear Ms. Exnicios:

We are in receipt of your letter dated April 13, 2010 transmitting two copies of the above-cited report. We have completed our review and have the following comments to offer.

The report is well written and meets the current field and report guidelines for archaeological investigations in Louisiana as required by the Louisiana Division of Archaeology. Also, we concur with the report's recommendations regarding the eligibility of 19 newly reported and two previously reported archaeological sites for the National Register of Historic Places (NRHP) after Phase I and some Phase II investigations.

These recommendations are as follows: newly reported sites 16PL173 through 16PL185, and 16PL187 through 16PL191 are not eligible for the NRHP, while 16PL186 is recommended as eligible for the NRHP. Previously reported archaeological sites 16PL153 and 16PL165 are recommended for Phase II testing to determine their NRHP eligibility should they be impacted in the future. We concur with those recommendations as well. We are especially gratified that the newly reported prehistoric Becnel/Perez multi-mound site (16PL186) is recommended as eligible for the NRHP and that the CEMVN "will not select an alignment that would intersect that site's defined boundaries."

Technical comments concerning several items are included with this letter. Please address these as appropriate in the preparation of the final report for this project and transmit two copies for our files. Also, please include a compact disk containing a pdf copy of the final report for the Division's electronic files. Finally, reports cannot be finalized until all site forms and site update forms have been accepted by the Division of Archaeology. Should you have any questions concerning our current comments, do not hesitate to contact Dennis Jones in the Division of Archaeology at (225) 342-6932 or by email at djones@crt.state.la.us

Sincerely,

Phil Boggan
Assistant State Historic Preservation Officer
PB:DJ:s

C: Mr. Martin Handly, URS Corporation (w/enclosures).

APPENDIX H
WATER QUALITY

Water Quality

The U.S. Army Corps of Engineers proposes to upgrade and incorporate 32 miles of existing non-federal back levees on the west bank of the Mississippi River in Plaquemines Parish, Louisiana, between the communities of Oakville and St. Jude into the federal levee system and construct from ground level two miles of earthen back levees. The levees would be raised to an authorized elevation of 12.0 ft. The non-federal levees (NFL) are divided into five sections and numbered one to five. The NFL sections are labeled as NFL- and the segment number.
The Plaquemines Parish NFL 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 NFL cross three sub-segments 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 sub-segments 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.”

The Bayou Barataria and Barataria Waterway segment contains all of NFL-1 and parts of NFL-2 and NFL-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-2 and NFL-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-4 and NFL-5 and a small portion of NFL-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 Dept. of Health and Hospitals)

Existing Conditions

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. The tables below 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 of Louisiana for all three sub-segments for dissolved oxygen, pH, and temperature. The site specific criteria are provided in the tables below. 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 show this information. The numeric criteria for fecal coliform for each segment are included in the tables. Bayou Barataria and Barataria Waterway has 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. For the Bayou Barataria and Barataria Waterway sub-segment, data were obtained from ambient water quality site number 899, Barataria Waterway Lafitte. The data are provided in Table 1. Only turbidity had a maximum value that exceeded the state's requirements of 50

NTU's 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 NTU's. All other parameters were within the values required by the state.

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 2. Of the data available for the sub-segment, only turbidity had a maximum value outside of the state standard of 50 NTU's for estuaries. Although the maximum observed value exceeds 50NTU's, more than 90% of the samples for turbidity were within the state's standard.

The Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere sub-segment had ambient water quality station number 909, Bayou Dulac, West of Bay Sanbois. The data are shown in Table 3. All the parameters which have numerical criteria from the state, meet the standards. Overall the water quality for the three sub-segments is good.

The final *2006 Louisiana Water Quality Inventory: Integrated Report* contains the most recent §303(d) List that has been approved by the EPA. The 2008 §303(d) List has been submitted by LDEQ to the EPA, but the 2008 §303(d) List has not been approved. The 2010 §303(d) List has been completed by LDEQ and is currently under public review. The 2006 §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 §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. LDEQ has classified the sub-segment 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 §303(d) List. The 2008 §303(d) List had the sub-segment listed as meeting its designated

use of oyster propagation and not impaired for fecal coliform. The 2010 §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. LDEQ has classified the sub-segment as IRC-5 and needing a TMDL for the specific water quality impairment. The priority for developing a TMDL for this sub-segment is listed in the 2010§303(d) List is once again low.

Impacts to Water Quality

The impacts to water quality from the raising of 32 miles of existing non-federal levees and the construction of two miles of earthen back levees should be limited to short-term impacts from elevated turbidity due to storm water discharges associated with the construction of the project. These impacts should be isolated to a small area around the project corridor. The State of Louisiana allows a 10 percent increase to the 50 NTU criteria for turbidity in estuaries from discharges. The impacts to water quality from turbidity will be minimized through the implementation of a storm water pollution prevention plan including features such as silt fencing and hay bales. Re-vegetation of the levee will be the last step of construction.

There should not be any long term impacts to water quality. Natural rainfall and tidal action should help provide a natural flushing action which will return the surrounding marsh to pre-construction turbidity levels.

Water quality impacts associated with the excavation and transportation of borrow material for the project is being addressed in Individual Environmental Reviews (IER's) as discussed in Section 4.19.

All project alternatives will have similar short term impacts to water quality as the proposed plans. The impacts to water quality with some of the alternative plans would have shorter time frames in which the impacts to turbidity would be present due to the shorter construction times.

Shorter construction times would result in less time that loose material would be exposed to wind and rain. The longer construction times are necessary to construct a quality product.

Table 1. Bayou Barataria and Barataria Waterway Ambient Data

	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	1954.2	44.0	51.7	89.4	1484.0	3314.5	4826.4	8148.0	N/A
COLOR (PCU)	24	39	22	26	30	37	50	54	55	
DISSOLVED OXYGEN (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
DISSOLVED OXYGEN, 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 1. Below
HARDNESS (AS CACO3) (mg/L)	35	759.8	81.2	104.8	131.0	506.0	1198.5	1708.4	3335.0	
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 (AS P) (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	5383	3	45	405	965	10102	13850	25760	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	35	6334	344	407	534	5110	9825	15020	29560	
SULFATE (mg/L)	35	277.2	24.0	28.9	33.6	198.0	451.0	671.2	1205.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	35	3725.8	214.0	249.2	293.0	2664.0	5750.0	8912.0	17780.0	N/A
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 NTU's
WATER TEMPERATURE (degrees C)	34	22.6	9.7	13.9	17.2	22.8	29.4	31.1	32.0	35 degrees C

1. No more than 25% of total monthly samples shall exceed a fecal coliform density of 400 COL/100mL

Table 2. Wilkinson Canal and Wilkinson Bayou Ambient Data

	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	6475.7	416.0	1691.0	3298.0	6104.5	9045.3	11832.9	15324.0	N/A
COLOR (PCU)	22	32	19	22	25	30	39	49	50	
DISSOLVED OXYGEN (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
DISSOLVED OXYGEN, 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 1. Below
HARDNESS (AS CACO3) (mg/L)	34	2331.3	204.0	575.4	1143.3	2144.0	3326.0	4223.9	5278.0	
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	
SPECIFIC CONDUCTANCE, FIELD (umhos/cm)	34	19119	3	5127	10810	18809	27490	34177	42880	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	34	19838	1703	6654	11553	18830	27513	35070	43070	
SULFATE (mg/L)	34	908.3	70.5	263.6	458.8	882.5	1286.8	1633.0	2259.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	34	12101.9	921.0	3647.4	6085.0	11390.0	16402.5	22550.0	28500.0	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 NTU's
WATER TEMPERATURE (degrees C)	34	22.0	9.0	11.5	17.5	22.8	28.1	30.9	31.5	35 degrees C

1.) Median MPN shall not exceed 14 fecal coliforms/100mL and no more than 10% of samples shall exceed 43MPN/100mL

Table 3. Bay Sansbois, Lake Judge Perez, and Bay De La Cheniere Ambient Data

	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	8827.9	1610.0	3846.0	6055.0	9576.0	11259.0	11927.0	13390.0	N/A
COLOR (PCU)	11	40	21	24	26	49	50	55	55	
DISSOLVED OXYGEN (mg/L)	23	6.81	4.77	5.17	5.82	6.52	7.84	8.47	9.83	4.0
DISSOLVED OXYGEN, 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 1. Below
HARDNESS (AS CACO3) (mg/L)	23	3381.7	780.0	1644.0	2450.0	3972.0	4232.0	4520.2	4946.0	
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 (AS P) (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	28253	11923	15307	23109	31707	33775	34828	40140	
SPECIFIC CONDUCTANCE, LAB (umhos/cm)	23	28693	12700	17120	23950	31800	33450	35480	39000	
SULFATE (mg/L)	23	1280.1	426.0	623.0	878.5	1368.0	1541.5	1776.8	2216.0	N/A
TOTAL DISSOLVED SOLIDS (mg/L)	23	17907.1	6840.0	9024.0	14800.0	19520.0	21090.0	23132.0	25333.0	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 NTU's
WATER TEMPERATURE (degrees C)	23	22.4	9.5	12.2	17.6	24.1	28.0	30.9	33.5	35 degrees C

1.) Median MPN shall not exceed 14 fecal coliforms/100mL and no more than 10% of samples shall exceed 43MPN/100mL

APPENDIX I
HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTES

FINAL
PHASE I ENVIRONMENTAL SITE ASSESSMENT OF EXISTING LEVEE ALIGNMENT AND ALTERNATIVE ROUTES FOR LEVEE CONSTRUCTION AND IMPROVEMENTS PLAQUEMINES NON-FEDERAL LEVEE PROJECT OAKVILLE to ST. JUDE, PLAQUEMINES PARISH, LOUISIANA
CONTRACT NUMBER: W912P8-07-D-0057 IDIQ
TASK ORDER NUMBER: 0042

PREPARED FOR:

US Army Corps of Engineers

US Army Corps of Engineers, Mississippi Valley Division
New Orleans District (USACE-MVN)
Environmental Division
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PREPARED BY:

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AES Project Number 0807-672-02

July 2009

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LIST OF ABBREVIATIONS

AEROSTAR	Aerostar Environmental Services, Inc.
AI#	Agency Interest Number
AST	Aboveground Storage Tanks
ASTM	American Society for Testing and Materials
AULs	Activity and Use Limitations
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CORRACTS	RCRA Corrective Action
ERNS	Emergency Response Notification System
EPA	Environmental Protection Agency
ERMD	Environmental Resource Management Department
ESA	Environmental Site Assessment
FTC	FirstSearch Technology Corporation
IC/EC	Institutional Controls/Engineering Controls
LDEQ	Louisiana Department of Environmental Quality
LUST	Leaking Underground Storage Tank
NFA	No Further Action
NFRAP	No Further Remedial Action Planned
NGVD	National Geodetic Vertical Datum
NPL	National Priority List
PCB	Polychlorinated Biphenyls
PRC	Property Record Card
RCRA	Resource Conservation and Recovery Act
RCRA-LQG	RCRA Large Quantity Generators
RCRA-SQG	RCRA Small Quantity Generators
RCRA TSD	RCRA Treatment, Storage and Disposal
RE	Real Estate Number
SWF/LF	Solid Waste Facilities/Landfills
SWF	Solid Waste Facilities
SWL	Solid Waste Landfill
SHWS	State Hazardous Waste Sites
TSD	Treatment, Storage and Disposal
USACE-MVN	US Army Corps of Engineers, Mississippi Valley Division New Orleans District
USGS	United States Geological Survey
UST	Underground Storage Tanks
VCP	Voluntary Cleanup Program

1.0 EXECUTIVE SUMMARY

1.1 Site Name

Plaquemines Parish Non-Federal Levee Project
Oakville to St. Jude
Plaquemines Parish, Louisiana
Contract Number: W912P8-07-D-0057 IDIQ
Task Order Number: 0042

1.2 Inspection Date(s)

Site visits were conducted at different dates due to changes in the proposed alignment.

February 19, 2008
February 20, 2008
November 17, 2008

1.3 Name of Inspector(s)

Robert Boudet, Angelle Camus

1.4 Client and User

Client: USACE-MVN
User: USACE-MVN

1.5 Site Description and General Observations

The existing non-federal levee route and alternative routes for earthen levee construction and improvements are divided into sections for reference. The routes are displayed on aerial photographs, labeled sections 1 through 5. The survey locations are described below:

Section 1:
Route 1: Starting at GPS point 29°47'00.15"N, 90°01'58.90"W, traverses west to GPS point 29°47'08.81"N, 90°02'32.53"W, south to GPS point 29°45'37.75"N, 90°02'43.58"W, east to GPS point 29°45'32.22"N, 90°02'18.09"W, and then east-southeast to end at GPS point 29°41'58.95"N, 89°59'25.73"W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.

Route 1A: Starting at GPS point 29°47'00.15"N, 90°01'58.90"W, traverses south-southwest to GPS point 29°45'32.22"N, 90°02'18.09"W. This route traverses primarily through pasture and agricultural fields.

Section 2:
Route 2: Starting at GPS point 29°41'58.95"N, 89°59'25.73"W, traverses east to GPS point 29°41'59.88"N, 89°59'14.94"W, west to GPS point 29°41'38.95"N, 90°00'23.72"W, southeast to GPS point 29°40'50.90"N, 89°59'32.66"W, west to GPS point 29°40'24.47"N, 90°00'55.30"W, east-southeast to GPS point 29°37'17.47"N, 89°57'13.78"W, then north to end at GPS point 29°38'05.79"N, 89°57'11.99"W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.

Route 2A: Starting at GPS point 29°41'59.88"N, 89°59'14.94"W, traverses south to follow the west side of Highway 23 to GPS point 29°38'09.20"N, 89°57'00.85"W.

Route 2A1: Starting at GPS point 29°40'39.44"N, 89°58'52.71"W, traverses south along the west side of Highway 23 around an electrical power station located at GPS point 29°40'26.80"N, 89°58'50.67"W to end at GPS point 29°40'07.21"N, 89°58'38.23"W.

Route 2B: Starting at GPS point 29°41'55.81"N, 89°59'21.97"W, traverses southeast to GPS point 29°38'02.16"N, 89°57'15.82"W, then northeast to end at GPS point 29°38'09.20"N, 89°57'00.85"W. This route traverses mostly through pasture and agricultural fields.

Section 3:
Route 3: Starting at GPS point 29°38'05.79"N, 89°57'11.99"W, traverses east-southeast to GPS point 29°38'00.21"N, 89°56'58.29"W, south to GPS point 29°37'33.13"N, 89°57'00.55"W, east-northeast to GPS point 29°37'36.58"N, 89°55'56.99"W, and then east-southeast to GPS point 29°36'55.99"N, 89°54'43.28"W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.

Route 3A1: Starting at GPS point 29°37'44.05"N, 89°56'07.08"W, follows Highway 23 approximately 300 feet to the north-northeast to GPS point 29°37'25.98"N, 89°55'56.99"W.

Section 4:
Route 4: Starting at GPS point 29°36'55.99"N, 89°54'43.28"W, traverses west to GPS point 29°36'52.41"N, 89°54'49.82"W, southeast to GPS point 29°35'54.98"N, 89°54'11.17"W, west to GPS point 29°35'42.46"N, 89°54'19.45"W, east to GPS point 29°33'22.90"N, 89°49'10.69"W, and then northeast to GPS point 29°34'23.10"N, 89°48'32.51"W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.

Route 4A: Starting at GPS point 29°36'55.99"N, 89°54'43.28"W, traverses east to GPS point 29°36'02.96"N, 89°51'40.53"W, and then southeast to GPS point 29°34'23.10"N, 89°48'32.51"W. This route follows the west side of Highway 23 and traverses primarily through pasture and agricultural fields.

Route 4B: Starting at GPS point 29°36'47.01"N, 89°54'46.55"W, traverses southeast to GPS point 29°36'28.03"N, 89°54'30.72"W, east to GPS point 29°35'29.96"N, 89°51'04.02"W, and then southeast to GPS point 29°34'09.09"N, 89°48'42.45"W. This route traverses primarily through pasture and agricultural fields.

Route 4C: Starting at GPS point 29°35'54.98"N, 89°54'11.17"W, traverses east to GPS point 29°35'25.39"N, 89°53'03.16"W, northeast to GPS point 29°35'20.96"N, 89°51'33.99"W, southeast to GPS point 29°34'14.22"N, 89°50'16.25"W, and then east to GPS point 29°33'49.49"N, 89°48'55.53"W. This route traverses primarily through pasture and agricultural fields.

Section 5:
Route 5: Starting at GPS point 29°34'21.11"N, 89°48'30.98"W traverses south-southwest to GPS point 29°34'18.29"N, 89°48'32.66"W, east-southeast to GPS point 29°34'11.91"N, 89°48'19.53"W, northeast to GPS point 29°34'14.82"N, 89°48'17.70"W, east to GPS point 29°34'12.64"N, 89°48'13.23"W, south-southwest to GPS point 29°34'09.71"N, 89°48'14.65"W, east-southeast to GPS point 29°34'07.75"N, 89°48'10.65"W, south-southwest to GPS point 29°34'04.90"N, 89°48'11.80"W, east-southeast to GPS point 29°33'57.66"N, 89°47'56.78"W, then northeast to GPS point 29°34'02.81"N,

89°47’52.67”W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.
Route 5A: Starting at GPS point 29°34’23.10”N, 89°48’32.51”W traverses southeast, ending at GPS point 29°32’36.32”N, 89°46’44.94”W. This route follows the west side of Highway 23 and traverses primarily through pasture and agricultural fields.

1.6 Findings and Conclusions

AEROSTAR has performed a Phase I ESA in conformance with the scope and limitations of ASTM Standard E 1527-05 of the Plaquemines Parish Non-Federal Levee Project, Plaquemines Parish, Louisiana, hereafter referred to as the subject site. Any exceptions to, or deletions from, this practice are described in Section 2 of this report. The Executive Summary serves as a summary of this report and presents the significant findings, conclusions and recommendations. The Executive Summary should not be considered a stand-alone document and must be evaluated in conjunction with the discussions, supporting documentation, and limitations within this ESA report.

This assessment has revealed no evidence of recognized environmental conditions in connection with the site, except for the following:

- REC 1 (29˚46´41.61″N, -90˚01´52.87″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST observed on residential property.

- REC 2 (29º 46' 52.67” N, -90º 2' 33.36” W) Onsite concerns were noted from the historical presence of a petroleum production well.

- REC 3 (29˚44´19.61″N, -90˚01´18.85″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs at Ollie Pump Station.

- REC 4 (29˚40´55.33″N, -89˚58´31.25″W) Offsite concerns were noted from the adjacent Conoco- Phillips Oil Refinery.

- REC 5 (29˚40´18.80″N, -90˚00´31.44″W) Onsite concerns were noted from a petroleum transfer station located along the corridor.

- REC 6 (29˚37´17.21″N, -89˚57´13.11″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs at Wilkinson Canal Pump Station.

- REC 7A (29˚37´37.11″N, -89˚56´06.96″W) Onsite concerns were noted from the use of the site for target shooting.

- REC 7B (29˚37´32.88″N, -89˚56´12.57″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs located at Plaquemines Parish Sheriff’s Office Training Center/ Campground.

- REC 7C (29˚37´28.23″N, -89˚56´31.16″W) Onsite concerns were noted from nuisance dumping of industrial-use pipes and lights.

- REC 8 (29˚37'55.43"N, -89° 57'06.88"W) Offsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with a diesel AST at the Myrtle Grove Marina.

- REC 9 (29˚37'21.97"N, -89° 55'11.17"W) Offsite concerns were noted from the operations of International Marine Terminal.

- REC 10 (29˚35´55.96″N, -89˚51´05.19″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST observed on Belle Chasse Marine Transfer Terminal.

- REC 11 (29˚35´41.54″N, -89˚50´48.52″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs located at Celeste Therapeutic Riding Center.

- REC 12 (29˚35´05.71″N, -89˚51´16.50″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST located in the middle of a pasture.

- REC 13 (29˚34´46.45″N, -89˚51´23.72″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with three diesel ASTs at the pump station.

- REC 14 (29˚34´43.26″N, -89˚49´27.77″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST located in the middle of a pasture.

- REC 15 (29˚34´23.18″N, -89˚48´30.75″W) Onsite concerns were noted from the the storage and use of petroleum products and/or hazardous materials associated with the operation of a petroleum pipeline.

- REC 16 (29˚34´15.81″N, -89˚48´15.74″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with the operation of the Plaqumine Parish Water Treatment facility.

- REC 17 (throughout corridor) Onsite and offsite concerns were noted from the current and historical uses of herbicides and pesticides associated with agricultural land.

A summary of recognized environmental conditions is provided in Table 1.

1.7 Reco mmendations

Based on the information reviewed during this investigation, additional assessment is recommended. AEROSTAR recommends conducting soil and groundwater sampling in the areas identified as having recognized environmental conditions. AEROSTAR recommends that these conclusions and recommendations be reviewed again as soon as construction plans are available.

The remainder of this report is organized as follows: Section 2 describes the scope of work and limitations for this report; Section 3 presents a site description; Section 4 presents user provided

information; Section 5 presents a records review; Section 6 presents a summary of the site reconnaissance; Section 7 presents a summary of interviews; Section 8 presents a summary of AEROSTAR's findings and opinions; Section 9 presents a summary of AEROSTAR's conclusions; Section 10 presents any deviations from the ASTM standard; Section 11 provides additional services conducted as part of this Phase I ESA; Section 12 presents the references; Section 13 presents the signatures of environmental professionals preparing and reviewing the report; and Section 14 presents the qualifications of the environmental professionals participating in this Phase I ESA. Figures are included in Appendix A. The property record information is included in Appendix B. Site photographs are included in Appendix C. A computerized regulatory agency database search is included in Appendix D. Historical research documentation is included in Appendix E. Interview documentation is included in Appendix F. A list of references is included in Appendix G. The qualifications and resumes of the environmental professionals performing this investigation are included in Appendix H.

TABLE 1 PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS				
FACILITY NAME/USE	**REC #**	**LAT/ LONG**	**SITE SUMMARY**	**RECS**
Residential Property	1	29˚46´41.61″N -90˚01´52.87″W	This site is used for residential and agricultural purposes, mostly citrus production.	One 100-gallon diesel AST observed on the property near the barn and guest house; storage and use of petroleum products and/or hazardous materials associated with agricultural site usage.
Residential Property	2	29º 46' 52.67" N, -90º 02' 33.36" W	This site is used for residential and agricultural purposes, mostly citrus production	Well serial number 122740 is located at approximately, 29º 46' 52.67" North and 90º 2' 33.36" West, near the northwest corner of the site. According to the LDNR database, the well was installed by the Lafourche Basin Levee District on December 12, 1967 to a depth of 1,206 feet. The hole was plugged and abandoned on August 17, 1968. Based on the information gathered, the historical drilling activities associated with this former well are considered to be a recognized environmental condition in connection with the site.
Ollie Pump Station	3	29˚44´19.61″N, -90˚01´18.85″W	The site is used as a water pumping station.	Two small ASTs and two large ASTs observed on the site; storage and use of petroleum products and/or hazardous materials at the pump station
Conoco-Phillips Oil Refinery	4	29˚40´55.33″N, -89˚58´31.25″W	This site has been operational since 1971.	A petroleum refinery has been located on this property since at least 1971.
Petroleum Transfer Station	5	29˚40´18.80″N, -90˚00´31.44″W	Petroleum pipeline transfer station	Storage of petroleum products on the site associated with the petroleum pipeline transfer station
Wilkinson Canal Pump Station	6	29˚37´17.21″N, -89˚57´13.11″W	The site is used as a water pumping station and includes two generator sheds and three ASTs.	Three ASTs observed on the site; storage and use of diesel at the pump station
Plaquemines Parish Sheriff's Office Training Center/ Campground	7A	29˚37´37.11″N, -89˚56´06.96″W	This property is used as a training center for the sheriff's department and includes a shooting range.	Lead contamination associated with spent materials from target shooting

TABLE 1 PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS				
FACILITY NAME/USE	**REC #**	**LAT/ LONG**	**SITE SUMMARY**	**RECS**
Plaquemines Parish Sheriff's Office Training Center/ Campground	7B	29°37′32.88″N, -89°56′12.57″W	This property is used as a training center for the sheriff's department and three ASTs were observed on the site.	One 2,000-gallon diesel AST and two small ASTs observed on the site; the two small AST's were empty, each had man made holes in the bottoms of the AST; storage and use of petroleum products and/or hazardous materials at the center.
Plaquemines Parish Sheriff's Office Training Center/ Campground property	7C	29°37′28.23″N, -89°56′31.16″W	This property is used as a training center for the sheriff's department and includes a shooting range.	Indiscriminate dumping of industrial-use pipes, lights and miscellaneous debris was observed in a field along the corridor.
Myrtle Grove Marina	8	29°37′55.43″N, -89°57′06.88″W	The site is used as a marina and contains one diesel AST	One 2,000-gallon AST; storage and use of petroleum products and/or hazardous materials at the marina
International Marine Terminal	9	29°37'21.97"N, -89°55'11.17"W	According to a telephone interview, this coal processing and shipping company site has been in operation since 1977.	Coal processing/ shipping company, water monitoring wells present
Belle Chase Marine Transfer	10	29°35′55.96″N, -89°51′05.19″W	The site is used as a terminal along the river.	One diesel AST; storage and use of petroleum products and/or hazardous materials at the center
Elkland	11	29°35′41.54″N, -89°50′48.52″W	Part of Celeste Therapeutic Riding Center	One AST of unknown content; storage and use of petroleum products and/or hazardous materials at the riding center
Residential/ Farmland 21140 Hwy 23	12	29°35′05.71″N, -89°51′16.50″W	The site is located in the middle of a pasture.	One AST; storage and use of petroleum products and/or hazardous materials at the site
Pump Station	13	29°34′46.45″N, -89°51′23.72″W	The site is used as a water pumping station and includes two generator sheds and ASTs.	Two diesel ASTs; storage and use of petroleum products and/or hazardous materials at the pump station

TABLE 1 PARCELS WITH RECOGNIZED ENVIRONMENTAL CONDITIONS				
FACILITY NAME/USE	**REC #**	**LAT/ LONG**	**SITE SUMMARY**	**RECS**
Residential/ Farmland	14	29°34′43.26″N, -89°49′27.77″W	The site is located in the middle of a pasture.	One AST; storage and use of petroleum products and/or hazardous materials at the site
Petroleum Pipeline	15	29°34′23.18″N, -89°48′30.75″W	The site has a petroleum pipeline going from Highway 23 to the Mississippi River	Petroleum pipeline present; storage and use of petroleum products and/or hazardous materials at the site
Plaquemine Parish Water Treatment Facility	16	29°34′15.81″N, -89°48′15.74″W	The site is an active water treatment facility	No storage tanks were identified during site verification; however, due to the nature of the facility, storage and use of petroleum products and/or hazardous materials is likely at the site
Agricultural Land	17	Throughout corridor	All land currently or historically used for agricultural purposes	Herbicide and pesticide applications associated with agricultural operations within the study area

2.0 INTRODUCTION

2.1 Purpose

The purpose of this Phase I ESA is to identify, to the extent feasible pursuant to ASTM Standard E 1527-05, recognized environmental conditions in connection with the site. The term recognized environmental conditions means the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the property or into the ground, groundwater or surface water of the property. The term includes hazardous substances or petroleum products even under conditions in compliance with laws. The term is not intended to include *de minimis* conditions that generally do not present a threat to human health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate governmental agencies. Conditions determined to be *de minimis* are not recognized environmental conditions.

Although performance of this investigation in a manner that is generally consistent with the ASTM Standard E 1527-05 Standard is of benefit, it should be recognized that the Standard of "All Appropriate Inquiry" or "good commercial or customary practice" can only be made on a case-by-case basis and is subject to judicial interpretation.

2.2 Scope of Work

This Phase I ESA was conducted in general accordance with ASTM Standard E 1527-05, "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process." The assessment consisted of four components: records review, site reconnaissance, interviews, and report preparation.

The scope of work does not include an evaluation of asbestos containing building materials, lead based paint, lead in drinking water, regulatory compliance, soil or groundwater sampling and analysis, cultural and historical resources, industrial hygiene, health and safety, ecological resources, indoor air quality, radon, site geotechnics (soils, foundations, site retention, etc.), wetlands, endangered species, or construction materials testing. AEROSTAR can provide these additional services, if requested.

2.2.1 Records Review

Historical Research: Sources such as historical aerial photographs, city directories, and fire insurance maps were reviewed, if reasonably ascertainable, to evaluate the historical usage of the site and surrounding properties. Additionally, a chain-of-title and an environmental lien search were reviewed if provided by the User.

Physical Setting Sources: Various maps, reports, and technical publications were reviewed and observations of site conditions were made to evaluate the hydrogeological/geological conditions associated with the site and surrounding properties. This data can provide pertinent information about the site, including soil classification, surface water flow directions, and possibly, an indication of the local directions of surficial aquifer groundwater flow.

Environmental Public Records Review: Reasonably ascertainable local, state, tribal and federal environmental records and the regulatory database search were reviewed to help assess the likelihood of problems from migrating hazardous substance or petroleum products. Public records identifying these facilities can provide indications of the potential for recognized environmental conditions to be present at the site.

AEROSTAR obtained, reviewed and evaluated reasonably ascertainable information from the Client, User, site owner; local, state, tribal, or federal entities; and the environmental regulatory database search. The conclusions and recommendations of this report are based, in part, on this information. The data reviewed during this investigation appeared to be accurate; however, the provided services do not include the verification of the accuracy or authenticity of information provided by others.

2.2.2 Site Reconnaissance

On-Site Reconnaissance: Visual and physical inspections conducted as part of this investigation included visually observing the corridor from the current levee right-of-way. Additionally, observations of access to and egress from the site were noted, as well as the presence and condition of any on-site buildings, utilities, or other improvements. During the site inspection, an emphasis was placed on observing the operations or conditions exhibiting the potential for recognized environmental conditions. All phases of the site reconnaissance were documented and photographs were taken.

Off-Site Reconnaissance: Off-site reconnaissance conducted as part of this investigation included visual and physical inspections of the adjoining properties from the site boundary and from publicly accessible areas. Additionally, a vehicular reconnaissance of the surrounding properties was conducted. During these inspections, an emphasis was placed on observing the operations or conditions exhibiting the potential for recognized environmental conditions. If any sources were identified, the inspector would document the name and location of the facility.

2.2.3 Interview s

AEROSTAR conducted interviews with available individuals familiar with the site, as well as local, state, tribal or federal agency representatives, regarding issues which could have an adverse effect on the environmental status of the subject site. Site owners and site occupants were not interviewed as part of this investigation.

AEROSTAR depends on the Client, tenant, and other site personnel to provide data pertinent to determining the environmental status of the site, which may or may not exist within public records. Site owners and site occupants were not interviewed as part of this investigation. The conclusions and recommendations of this report are based, in part, on available public information. The data obtained during this investigation appeared to be accurate; however, the provided services do not include the verification of the accuracy or authenticity of information provided by others.

2.2.4 Report Preparation

This report was prepared based upon the information provided by the Client and the User, the observations made during the site reconnaissance, and the information obtained from a review of readily available records. Given the inherent limitations of environmental assessment work, AEROSTAR will not guarantee that any site is free of hazardous or potentially hazardous materials or that latent or undiscovered conditions will not become evident in the future. This report was prepared within the professional conduct of the industry and in accordance with the proposal and the standard terms and conditions presented in the contract. No other warranties, representations or certifications are made.

2.3 Limitations

AEROSTAR has prepared this assessment for the Client and User. AEROSTAR's assessment represents a review of certain information relating to the site that was obtained by methods described above and does

not include sampling or other monitoring activities at the property. While AEROSTAR has used reasonable care to avoid reliance upon data and information that is inaccurate, AEROSTAR is not able to verify the accuracy or completeness of all data and information available during the investigation. Some of the conclusions in this report would be different if the information upon which they are based is determined to be false, inaccurate or incomplete.

AEROSTAR makes no legal representations whatsoever concerning any matter including, but not limited to, ownership of any property or the interpretation of any law. AEROSTAR further disclaims any obligations to update the report for events taking place after the time during which the assessment was conducted.

This report is not a comprehensive site characterization and should not be construed as such. The opinions presented in this report are based upon the findings derived from a site reconnaissance, a limited review of specified regulatory records and historical sources, and comments made by the interviewees.

Phase I ESAs, by their very nature, are limited. AEROSTAR has endeavored to meet what it believes is the applicable standard of care, and, in doing so, is obliged to advise the Client and User of Phase I ESA limitations. AEROSTAR believes that providing information about limitations is essential to help the Client and User identify and thereby manage its risks. Through additional research, these risks can be mitigated - but they cannot be eliminated. AEROSTAR will, upon request, advise the Client and User of the additional research opportunities available, their impact, and their cost.

As noted above, the Phase I ESA was conducted at the referenced site, and this report was prepared for the sole use of the Client and User. This report shall not be relied upon by or transferred to any other party without the express written authorization of AEROSTAR.

Along with all of the limitations set forth in various sections of the ASTM Standard E 1527-05 protocol, the accuracy and completeness of this report is necessarily limited by the following:

- At the request of the client, a chain-of-title and an environmental lien search were not conducted.
- At the request of the client, AEROSTAR did not conduct interviews with the owner or operators of the facilities along the corridor.
- AEROSTAR was unable to gain access to the interior of the site buildings during the site inspection.
- Individual sites along the corridor were not inspected due to access restrictions. All inspections were performed from adjacent right-of-ways.

2.3.1 Data Gaps

Data gaps are the lack or inability to obtain information required by ASTM Standard E 1527-05 despite good faith efforts to gather such information, such as, but not limited to, the inability to conduct a site visit, inability to conduct interviews, and the inability to establish historical uses of the site or surrounding properties. Not all data gaps are significant, and a data gap will only be discussed in this section if: 1) a data gap occurs during investigation, and 2) the data gap impairs AEROSTAR's ability to meet the objectives of ASTM Standard E 1527-05.

Historical Data Source Failures: Aerial photographs were not available for review prior to 1983. City directories for the subject site area, specifically Highway 23, were not available prior to 1996. Sanborn Fire Insurance Maps did not cover the site vicinity. The historical records researched did not allow the

property's history to be traced back to 1940 or to the property's first developed use, whichever came first, which constitutes historical data failure per ASTM Standard E 1527-05 § 8.3.2.3.
The following significant data gaps were noted: site owners and site occupants were not interviewed, and an environmental lien search was not performed of the site.

No other apparent significant data gaps were noted during the investigation of the site.

2.4 Special Terms and Conditions

This report, and the information contained herein, shall be the sole property of AEROSTAR until payment of any unpaid balance is made in full. The Client and User agree that until payment is made in full, the Client and User shall not have a proprietary interest in this report or the information contained herein. AEROSTAR shall have the absolute right to request the return of any and all copies of this report submitted to other parties, public or private, on behalf of the Client and User in the event of nonpayment of outstanding fees by the Client pursuant to AEROSTAR's proposal.

2.5 User Reliance

This report is intended for the sole use of Client and User. Its contents may not be relied upon by other parties without the explicit written consent of AEROSTAR. This is not a statement of suitability of the property for any use or purpose.

3.0 SITE DESCRIPTION

3.1 Location

The existing non-federal levee route and alternative routes for earthen levee construction and improvements are divided into sections for reference. The routes are displayed on aerial photographs, labeled sections 1 through 5. The survey locations are described below:

Section 1:
Route 1: Starting at GPS point 29°47'00.15"N, 90°01'58.90"W, traverses west to GPS point 29°47'08.81"N, 90°02'32.53"W, south to GPS point 29°45'37.75"N, 90°02'43.58"W, east to GPS point 29°45'32.22"N, 90°02'18.09"W, and then east-southeast to end at GPS point 29°41'58.95"N, 89°59'25.73"W. This route includes and follows the existing non-federal levee through primarily pasture and undeveloped marshland.

Route 1A: Starting at GPS point 29°47'00.15"N, 90°01'58.90"W, traverses south-southwest to GPS point 29°45'32.22"N, 90°02'18.09"W. This route traverses mostly through primarily pasture and agricultural fields.

Section 2:
Route 2: Starting at GPS point 29°41'58.95"N, 89°59'25.73"W, traverses east to GPS point 29°41'59.88"N, 89°59'14.94"W, west to GPS point 29°41'38.95"N, 90°00'23.72"W, southeast to GPS point 29°40'50.90"N, 89°59'32.66"W, west to GPS point 29°40'24.47"N, 90°00'55.30"W, east-southeast to GPS point 29°37'17.47"N, 89°57'13.78"W, then north to end at GPS point 29°38'05.79"N, 89°57'11.99"W. This route includes and follows the existing non-federal levee through primarily pasture and undeveloped marshland.

Route 2A: Starting at GPS point 29°41'59.88"N, 89°59'14.94"W, traverses south to follow the west side of Highway 23 to GPS point 29°38'09.20"N, 89°57'00.85"W.

Route 2A1: Starting at GPS point 29°40'39.44"N, 89°58'52.71"W, traverses south along the west side of Highway 23 around an electrical power station located at GPS point 29°40'26.80"N, 89°58'50.67"W to end at GPS point 29°40'07.21"N, 89°58'38.23"W.

Route 2B: Starting at GPS point 29°41'55.81"N, 89°59'21.97"W, traverses southeast to GPS point 29°38'02.16"N, 89°57'15.82"W, then northeast to end at GPS point 29°38'09.20"N, 89°57'00.85"W. This route traverses mostly through pasture and agricultural fields.

Section 3:
Route 3: Starting at GPS point 29°38'05.79"N, 89°57'11.99"W, traverses east-southeast to GPS point 29°38'00.21"N, 89°56'58.29"W, south to GPS point 29°37'33.13"N, 89°57'00.55"W, east-northeast to GPS point 29°37'36.58"N, 89°55'56.99"W, and then east-southeast to GPS point 29°36'55.99"N, 89°54'43.28"W. This route includes and follows the existing non-federal levee through primarily pasture and undeveloped marshland.

Route 3A1: Starting at GPS point 29°37'44.05"N, 89°56'07.08"W, follows Highway 23 approximately 300 feet to the north-northeast to GPS point 29°37'25.98"N, 89°55'56.99"W.

Section 4:
Route 4: Starting at GPS point 29°36'55.99"N, 89°54'43.28"W, traverses west to GPS point 29°36'52.41"N, 89°54'49.82"W, southeast to GPS point 29°35'54.98"N, 89°54'11.17"W, west to GPS

point 29°35'42.46"N, 89°54'19.45"W, east to GPS point 29°33'22.90"N, 89°49'10.69"W, and then northeast to GPS point 29°34'23.10"N, 89°48'32.51"W. This route includes and follows the existing non-federal levee through primarily pasture and undeveloped marshland.

Route 4A: Starting at GPS point 29°36'55.99"N, 89°54'43.28"W, traverses east to GPS point 29°36'02.96"N, 89°51'40.53"W, and then southeast to GPS point 29°34'23.10"N, 89°48'32.51"W. This route follows the west side of Highway 23 and traverses primarily through pasture and agricultural fields.

Route 4B: Starting at GPS point 29°36'47.01"N, 89°54'46.55"W, traverses southeast to GPS point 29°36'28.03"N, 89°54'30.72"W, east to GPS point 29°35'29.96"N, 89°51'04.02"W, and then southeast to GPS point 29°34'09.09"N, 89°48'42.45"W. This route traverses through primarily pasture and agricultural fields.

Route 4C: Starting at GPS point 29°35'54.98"N, 89°54'11.17"W, traverses east to GPS point 29°35'25.39"N, 89°53'03.16"W, northeast to GPS point 29°35'20.96"N, 89°51'33.99"W, southeast to GPS point 29°34'14.22"N, 89°50'16.25"W, and then east to GPS point 29°33'49.49"N, 89°48'55.53"W. This route traverses primarily through pasture and agricultural fields.

Section 5:
Route 5: Starting at GPS point 29°34'21.11"N, 89°48'30.98"W traverses south-southwest to GPS point 29°34'18.29"N, 89°48'32.66"W, east-southeast to GPS point 29°34'11.91"N, 89°48'19.53"W, northeast to GPS point 29°34'14.82"N, 89°48'17.70"W, east to GPS point 29°34'12.64"N, 89°48'13.23"W, south-southwest to GPS point 29°34'09.71"N, 89°48'14.65"W, east-southeast to GPS point 29°34'07.75"N, 89°48'10.65"W, south-southwest to GPS point 29°34'04.90"N, 89°48'11.80"W, east-southeast to GPS point 29°33'57.66"N, 89°47'56.78"W, then northeast to GPS point 29°34'02.81"N, 89°47'52.67"W. This route includes and follows the existing non-federal levee primarily through pasture and undeveloped marshland.

Route 5A: Starting at GPS point 29°34'23.10"N, 89°48'32.51"W traverses southeast, ending at GPS point 29°32'36.32"N, 89°46'44.94"W. This route follows the west side of Highway 23 and traverses primarily through pasture and agricultural fields.

3.2 Site and Vicinity General Characteristics

At the time of our investigation, the site consisted of approximately 36 miles of existing levee, marshland, swampland, pastureland, forested land, and industrial/commercial and residential properties. The immediate vicinity surrounding the site is primarily characterized by industrial/commercial/residential and agricultural properties and the Mississippi River to the east. Please refer to the Street Site Location Map in Figure 1, the Topographic Site Location Map in Figure 2, and the Site Plan in Figure 3 for additional details.

3.3 Current Use(s) of the Site

The site use includes a mixture of residential, industrial and commercial operations, including but not limited to a petroleum transfer station, and agricultural land. All observations of the properties located on subject site were made from the existing levee system or public roads. Several ASTs were observed at each pumping station, on residential properties, and at the Plaquemines Parish Sheriff's Office Training Center/ Campground. Observations made during the site reconnaissance are further discussed in Section 6 of this report.

3.4 Structures, Roads, and Other Improvements on the Site

3.4.1 Existing Structures

The site is developed with several industrial, commercial and residential structures. The structures consist of brick faced and wood framed residential structures, mobile homes, and metal and concrete blocked commercial structures.

3.4.2 Existing Roads

Highway 23 traverses along the subject site area to north and/or east of the site beginning in Section 1. West Ravenna Road runs through the north-central portion of section 2, beginning at route 2A and ending at route 2. Lake Hermitage Road runs south of the subject site along the southwestern portion of section 4. Lacrosse Lane traverses through the southeastern portion of section 4, beginning at route 4A and ending at route 4. Several residential streets are also located within the subject site area.

3.4.3 Heating/Cooling System

Heat is provided to the subject site area by natural gas and electrical heating units and cooling is provided by electrically powered central and window air conditioning units.

3.4.4 Utilities (including Sewage Disposal)

Utilities are provided to the site area as follows: electricity is provided by Entergy, natural gas is provided by Atmos Energy, and sanitary sewer is provided by Plaquemine Parish and private septic systems.

3.4.5 Potable Water

Potable water is provided by Plaquemine Parish Water Department.

3.5 Current Uses of the Adjoining Properties

The current uses of the adjoining properties are as follows:

Table 2A
Description of Adjoining Parcels – Section 1

Direction From Site	Address	Description of Current Use
North	NA	Undeveloped marshland, followed by the town of Oakville
East	NA	Pastureland, residential structures, and Highway 23, followed by the Mississippi River.
South	NA	Undeveloped marshland
West	NA	Undeveloped marshland

Table 2B
Description of Adjoining Parcels –Section 2

Direction From Site	Address	Description of Current Use
North	NA	LaRuesitte Siphon and the existing non-federal levee (Section 1)

Table 2B Description of Adjoining Parcels –Section 2		
Direction From Site	**Address**	**Description of Current Use**
East	NA	Highway 23, Conoco-Phillips Oil Refinery, residential structures and pastureland followed by the Mississippi River.
South	NA	Undeveloped marshland
West	NA	Undeveloped marshland

Table 2C Description of Adjoining Parcels –Section 3		
Direction From Site	**Address**	**Description of Current Use**
North	NA	Highway 23, hardwood forest, and International Marine Terminals followed by the Mississippi River.
East	NA	Highway 23, hardwood forest, International Marine Terminals, followed by the Mississippi River.
South	NA	Myrtle Grove Marina and Estates, followed by undeveloped marshland
West	NA	Myrtle Grove Marina and Estates, existing non-federal levee (Section 2), followed by pastureland and undeveloped marshland.

Table 2D Description of Adjoining Parcels –Section 4		
Direction From Site	**Address**	**Description of Current Use**
North	NA	Highway 23, pastureland, and residential structures, followed by the Mississippi River.
East	NA	Highway 23, pastureland, and residential structures
South	NA	Undeveloped marshland
West	NA	Undeveloped marshland and existing non-federal levee (Section 3)

Table 2E Description of Adjoining Parcels –Section 5		
Direction From Site	**Address**	**Description of Current Use**
North	NA	Highway 23, residential structures, petroleum pipelines, and a water treatment plant, followed by the Mississippi River.
East	NA	Highway 23, pastureland, mixed scrub/ forestland, followed by the Mississippi River.
South	NA	Undeveloped marshland
West	NA	Undeveloped marshland, existing non-federal levee (Section 4), followed by pastureland.

4.0 USER PROVIDED INFORMATION

4.1 Title Records

A chain-of-title report for the site was not provided to AEROSTAR by the User or Client.

4.2 Environmental Liens or Activity and Use Limitations

Due to the number of parcels associated with the site, the Client did not request an environmental lien. According to the USACE MVN, the site has no AULs.

4.3 Specialized Knowledge

No information was provided to AEROSTAR by the User with respect to any specialized knowledge or experience that may pertain to recognized environmental conditions in connection with the site.

4.4 Commonly Known or Reasonably Ascertainable Information

The User was not aware of any commonly known or reasonably ascertainable information about the site that would indicate the presence of recognized environmental conditions associated with the property.

4.5 Valuation Reduction for Environmental Issues

The User indicated the purchase or sale price reflected the fair market value of the site.

4.6 Owner, Property Manager, and Occupant Information

The properties associated with the site are owned, managed, and occupied by numerous individuals and businesses. Specific information concerning individual site owners and occupants is not provided at the request of the Client

4.7 Reason for Performing Phase I ESA

The purpose of this ESA was to complete an assessment in a good commercial and customary fashion at the property with respect to the range of hazardous substance, pollutants, or contaminants within the scope of the CERCLA, as well as for petroleum product contaminants. The ESA has been completed to determine the potential for contamination by means of appropriate inquiries into previous ownership and into uses of the property consistent with good commercial or customary practices.

4.8 Other

No other information was provided by the User.

5.0 REC ORDS REVIEW

5.1 Standard Environmental Record Sources

As a part of this assessment, AEROSTAR reviewed information sources to obtain existing information pertaining to a release of hazardous substances or petroleum products on or near the site. AEROSTAR obtained an ASTM regulatory database search through FTC. A copy of the database report is included in Appendix D. AEROSTAR also reviewed other available standard environmental record sources at the LDEQ, as needed. Table 3 presents the summary of the regulatory database report.

TABLE 3
Regulatory Database Summary

Source	Applicable Search Distance	Site	Adjoining Property	Within ASTM search distances
Federal NPL Site	1.0 mile	0	0	0
Federal Delisted NPL	0.5 mile	0	0	0
Federal CERCLIS List	0.5 mile	0	0	0
Federal CERCLIS NFRAP Site List	0.5 mile	0	0	0
Federal RCRA CORRACTS and TSD Facilities	1.0 mile	0	0	0
Federal RCRA Non-CORRACTS TSD Facilities	0.5 mile	0	0	0
Federal RCRA Generators Lists	Site and adjoining properties	1	0	1
Federal IC/EC Registries	Site Only	0	NA	0
Federal ERNS	Site Only	0	NA	0
State- and Tribal-equivalent NPL Sites	1.0 mile	0	0	0
State- and Tribal-equivalent CERCLIS Sites	0.5 mile	0	0	0
State and Tribal Landfill and/or Solid Waste Disposal Site Lists	0.5 mile	0	0	0
State and Tribal LUST Lists	0.5 mile	0	0	0
State and Tribal Registered UST Lists	Site and adjoining properties	0	0	0
State and Tribal IC/EC	Site Only	0	NA	0
State and Tribal voluntary cleanup sites	0.5 mile	0	0	0
State and Tribal Brownfield sites	0.5 mile	0	0	0

No NPL, delisted NPL, CERCLIS, CERCLIS NFRAP, SWF/LF, VCP, Brownfields sites, CORRACTS TSD, non-CORRACTS TSD, Federal institutional/engineering control registries, ERNS, state- or tribal-equivalent NPL, state- or tribal-equivalent CERCLIS facilities, LUST, UST, or AST facilities were identified within the ASTM-specified search distances for the subject site.

In addition to reviewing the database report, AEROSTAR performed reconnaissance of the site vicinity to identify any sites not mapped by FTC due to inadequate or inaccurate address information and to look for unregistered facilities. Ten AST facilities were observed within the subject site area. All tanks appeared

to be approximate 500-gallon tanks constructed on metal skids. These tanks are discussed in detail in Section 6. One UST facility was observed during field reconnaissance and is discussed below.

Express Food and Fuel 14175 Highway 23 AI# 76577: This UST facility was field verified to be located approximately 600 feet northeast of the corridor. According to LDEQ-EDMS, this facility has three, 8,000-gallon, gasoline USTs. The tanks are constructed of metal with a plastic coating. No releases are reported for this facility. Based on the information gathered for this investigation, this facility is not suspected of negatively impacting the site.

5.2 Additional Environmental Record Sources

AEROSTAR performed a review of gas and oil production wells on the LDNR website for the subject site and vicinity. The wells are located in numerous fields and are owned by several different operators. Those wells located on the site and within approximately 500 feet of the subject corridor are discussed below.

Well serial number 122740 is located at approximately, 29º 46' 52.67" North and 90º 2' 33.36" West, near the northwest corner of the site. According to the LDNR database, the well was installed by the Lafourche Basin Levee District on December 12, 1967 to a depth of 1,206 feet. The hole was plugged and abandoned on August 17, 1968. Based on the information gathered, the historical drilling activities associated with this former well are considered to be a recognized environmental condition in connection with the site.

5.3 Physical Setting Sources

The Bertrandville, LA Quadrangle Map (most recent date 1995), Lafitte LA; Quadrangle Map (dated 1995); Lake Laurier, LA Quadrangle Map (dated 1973, Minor Revision 1992); Phoenix, LA Quadrangle Map (dated 1973); and Pointe A La Hache, LA, Quadrangle Map (dated 1973, Minor Revision 1992) USGS topographic quadrangle maps; and regulatory files available regarding properties of environmental concern in the site vicinity were reviewed as sources for obtaining information regarding the physical setting of the site and surrounding vicinity.

5.3.1 Regional Geology

Plaquemines Parish lies entirely within the Mississippi River Delta. Plaquemines Parish consists of at least two thick, partially overlapping delta complexes, the St. Bernard and the Plaquemines-Modern complexes. They are underlain by Pleistocene strata at a depth of 100 to 700 feet. Depth to Pleistocene surfaces increases toward the modern delta. Delta lobes of the St. Bernard Delta complex were initially deposited in shallow water about 4,500 years ago. Several lobes were deposited, and periods of progradation and abandonment recurred until about 650 years ago. Deposition of the Plaquemines lobe, which was the early distribution system of the Plaquemines-Modern Delta complex, began about 950 years ago. The Balize Delta lobe, which was the second and present distributary system of the Plaquemines-Modern Delta complex, consists of several sub-deltas that have a much better defined chronology than the earlier complexes. The Balize Delta lobe is the only deepwater delta lobe of the Mississippi River, and thus has an unusual bird's-foot morphology.

5.3.2 Topography

The area of the investigation is located in Sections 6-12, Township 15 South, Range 24 East (Bertrandville, LA Quadrangle Map); Sections 12-19, Township 15 South, Range 24 East and Section 2, Township 16 South, Range 24 East (Lafitte, LA Quadrangle Map); Sections 1-8, Township 16 South,

Range 25 East and Sections 21-22, Township 16 South, Range 26 East (Lake Laurier, LA Quadrangle Map); Sections 9-11, Township 17 South, Range 25 East; Sections1-10, Township 16 South, Range 25 East; and Sections 1-16, Township 16 South, Range 24 East (Phoenix, LA Quadrangle Map); and numerous Sections (specific section numbers undeterminable) within Townships 17 South and 18 South, Ranges 13 East and 14 East (Pointe A La Hache, LA, Quadrangle Map) as referenced in the 7.5-minute USGS Topographical Quadrangle Maps of Bertrandville, LA Quadrangle Map (most recent date 1995), Lafitte LA; Quadrangle Map (dated 1995); Lake Laurier, LA Quadrangle Map (dated 1973, Minor Revision 1992); Phoenix, LA Quadrangle Map (dated 1973); and Pointe A La Hache, LA, Quadrangle Map (dated 1973, Minor Revision 1992). Based on a review of the topographic maps, the site appears to slope to the west and south towards the marsh and swampland. According to the topographic map, the site is situated at an elevation of approximately sea level or below the NGVD of 1929.

Surface water bodies were identified on the topographic maps in the vicinity of the site. The site is bisected by numerous named and unnamed canals. The Mississippi River is located approximately 0.1 miles east of the area and numerous smaller named and unnamed canals and marshland are located to the west of the area. Based upon a review of the topographic maps, regional shallow groundwater flow in the immediate vicinity of the study area appears to be towards any of the various smaller canals, ditches, or marshland generally located southwest and west of the study area (some bisect the study area). The surface water and shallow groundwater does not appear to flow directly into the Mississippi River due to the presence of levees. Actual groundwater flow in the vicinity of the study area may be locally influenced by seasonal rainfall, proximity to surface bodies of water (lakes, rivers, canals), surface topography, underground structures, soil and bedrock geology, production wells and other factors beyond the scope of this study.

5.3.3 Soils/Geology

The United States Department of Agriculture Natural Resources Conservation Service, *Soil Survey of Plaquemines Parish, Louisiana* Map Numbers 6, 9, 10, 14, 17, 21, 22, 26, 30, and 31 were reviewed to identify native soil characteristics in the vicinity of the site. According to the survey, the soils are primarily classified as:

Sharkey Clay (Sk) - Mineral soil that is level and poorly drained. It is in low positions on the natural levees of the Mississippi River and its distributaries, and it is protected from most flooding by large earthen levees. The slope is less than 1 percent. Permeability of this soil is very slow. Water runs off the surface slowly and stands in low places for long periods after heavy rains. Flooding is rare, but it can occur after prolonged heavy rainfall. The surface layer is very dark gray clay about 4 inches thick. The subsoil is dark gray and gray clay, about 36 inches thick. The substratum to a depth of about 65 inches is gray clay. A seasonal high water table fluctuates between the soil surface and a depth of about 2 feet during the winter and spring. The surface layer of this soil is very sticky when wet and very hard when dry. This soil has a very high shrink-swell potential and has high fertility.

Rita Mucky Clay (Ra) – Mineral soil that is level and poorly drained. It is in former freshwater marshes that are drained, and it is protected from most flooding. The slope is less than 1 percent. The surface layer is very dark gray mucky clay about 5 inches thick. It is dark gray and very dark gray, firm clay. The subsoil is permanently cracked in the upper part. The substratum to a depth of about 60 inches is gray, slightly fluid silty clay loam in the upper part and olive gray silt loam in the lower part. This soil is protected from most flooding by levees and drained with pumps. Under normal conditions, the water table is maintained at a depth of 2 to 3 feet below the surface. After high intensity rains of long duration, however, the water table is within 1 foot of the surface for short periods. Flooding is rare and only occurs during hurricanes or other severe storms. Permeability is very slow in the soil material and rapid in the network of permanent cracks in the subsoil. This soil has high fertility and the content of organic matter

is very high. The shrink-swell potential is high, however any part of the substratum that remains continuously saturated will have a low shrink-swell potential.

Barbary Muck (BB) – Mineral soil that is level and very poorly drained. It is in broad, ponded freshwater swamps, ranging in areas from 50 to 2,000 acres. The slope is less than 1 percent. The surface layer is very dark grayish brown, very fluid muck about 4 inches thick. The underlying material to a depth of about 60 inches is dark gray, very fluid clay. In places, buried logs are in the underlying material. This soil is flooded most of the time by fresh water, and it is saturated throughout the year. Most areas are also occasionally flooded by salt water during storms. During non-flood periods, the seasonal high water table ranges from 1 foot above the 0.5 foot below the surface. Permeability is very slow. While the soil is continuously saturated, the shrink-swell potential is low. If the soil is drained, the shrink-swell potential is very high.

Commerce Silt Loam (Cm) – Mineral soil that is level and somewhat poorly drained. It is in high and intermediate positions on natural levees of the Mississippi River and its distributaries. The slope is less than 1 percent. The surface layer is dark, grayish brown silty loam about 8 inches thick. The subsoil extends to a depth of about 38 inches. It is grayish brown silty clay loam in the upper part, grayish brown silt loam in the next part, and gray silty clay loam in the lower part. The substratum to a depth of about 60 inches is gray silt loam. This soil has high fertility. The permeability is moderately slow and water runs off the surface slowly. A seasonal high water table fluctuates between depths of about 1.5 and 4 feet from December through April. This soil has a moderate shrink-swell potential.

Commerce Silty Clay Loam (Co) – Mineral soil that is level and somewhat poorly drained. It is in intermediate positions on natural levees of the Mississippi River and its distributaries. The slope is less than 1 percent. The surface layer is dark gray silty clay loam about 4 inches thick. The subsoil to a depth of about 30 inches is grayish brown silty clay loam. The underlying material to a depth of about 60 inches is grayish brown silty loam in the upper part and gray silty clay loam in the lower part. This soil has high fertility. The permeability is moderately slow and water runs off the surface slowly. A seasonal high water table fluctuates between depths of about 1.5 and 4 feet from December through April. This soil has a moderate shrink-swell potential.

Clovelly Muck (CE) – Organic soil that is level, very poorly drained, and slightly saline. It is in brackish marshes, and it is flooded and ponded most of the time. The slope is less than 1 percent. The organic surface layer is a very dark gray, very fluid muck about 42 inches thick. The underlying material to a depth of about 70 inches is gray, very fluid clay. This soil is flooded most of the time by brackish water, and it is wet throughout the year. During tidal storms, it is covered by as much as 5 feet of water. Water is above the surface during most of the year, but during periods of sustained north wind and low tides, the water table drops to about 0.5 foot below the surface. Permeability is rapid in the organic surface layer and very slow in the clayey underlying material. The total subsidence potential is high. If drained, the organic material, on drying, initially shrinks to about half the original thickness and then subsides further as a result compaction and oxidation. While continuously saturated, this soil has a low shrink-swell potential. The shrink-swell potential will be very high in the clayey underlying material if the soil is drained.

Gentilly Muck (GE) - Mineral soil that is level and very poorly drained. It is in brackish marshes, and it is flooded or ponded most of the time. The slope is less than 1 percent. The surface layer is a very dark gray, very fluid muck about 10 inches thick. The underlying material to a depth of about 60 inches is dark gray, slightly fluid clay in the upper part, and gray, very plastic clay in the lower part. This soil is flooded most of the time and is wet throughout the year. During storms, the soil is covered by as much s 4 feet of water. The water table ranges from 3 feet above the surface to 0.5 foot below the surface. This soil has low strength. It is saturated is saturated with water and is very fluid in the upper part. The total

subsidence potential is medium. While the soil is continuously saturated, the shrink-swell potential is low. If the soil is drained, the shrink-swell potential will be very high. Permeability is very slow.

Sharkey Silty Clay Loam (Sh) – Mineral soil that is level and poorly drained. It is in low and intermediate positions on natural levees of the Mississippi River and its distributaries, and it is protected from most flooding by earthen levees. The slope is less than 1 percent. The surface layer is dark gray silty clay loam about 5 inches thick. The subsoil is about 40 inches thick. It is gray clay in the upper part and dark gray clay in the lower part. The substratum to a depth of about 60 inches is gray clay. In places, the surface layer is silt loam. This soil has high fertility. Permeability is very slow; water runs off the surface slowly and stands in low places for short periods after heavy rains. Flooding is rare, but can occur after heavy rains of long duration. A seasonal high water table fluctuates between a depth of about 2 feet and the soil surface during the winter and spring. The surface layer of this soil is sticky when wet and hard when dry. The shrink-swell potential is very high.

Westwego Clay (Ww) - Mineral soil that is level and poorly drained. It is in former swamps that have been drained, and it is protected from most flooding. The slope is less than 1 percent. The surface layer is very dark gray, firm clay about 4 inches thick. The subsoil is about 27 inches thick, and is dark gray, firm clay. The subsoil has shrunk and cracked, and remains cracked when re-wetted. The next layer is about 18 inches thick, and is a very dark grayish brown, very fluid muck. Below this, to a depth of about 62 inches, is dark gray, very fluid clay. In places, many logs and stumps are buried in the lower layers. In many of the areas developed for urban uses, the surface layer has been covered with loamy and sandy fill material. This soil has been drained by pumps and is protected from flooding by levees. Under normal conditions, the water table is maintained at a depth of about 2 to 3 feet below the surface. After heavy rains, the water table may be within 1 foot of the surface for short periods. In places where the soil has subsided, the water table is near the surface most of the time. Flooding is rare, but it can occur during hurricanes and when water pumps and protection levees fail. Permeability is very slow in the soil material, but water flows rapidly through the network of cracks. The total subsidence potential is medium to high. The shrink-swell potential is high.

5.3.4 Hydrogeology

Most groundwater in southeastern Louisiana is moderately saline to highly saline. Potable drinking water is only available in local areas. Near surface silt and very fine sand form lenses of clayey and natural levee deposits that yield potable water. The surface water system is a complex hydrologic regime that involves the movement of freshwater and salt water masses through the region as a result of the interaction between the Mississippi River discharge, regional precipitation, winds, and tides. This current hydrologic regime is influenced by both natural and manmade factors. The basic natural hydrologic system is governed by the pattern of major abandoned distributary channels of the ancient Mississippi River delta complex and interdistributary basin channels, which serve to drain swamps and marshes into the estuarine lakes, bays, and sounds.

Based on information available in the soil survey, a shallow groundwater table is typically located between 0.5 feet and 3 feet below the surface in the vicinity of the subject site. Therefore, the shallow groundwater flow direction is expected to generally follow the local topography and may be affected by localized conditions (i.e. ditches, ponds or wetlands). Based on the available information, the shallow groundwater flow in the vicinity of the subject site is expected to be in a generally southwestern direction.

5.4 Historical Use Information on the Site

Historical use information was obtained from the review of aerial photographs, historical topographic maps and limited interviews. The existing non-federal levee has been developed since at least 1966, the

earliest aerial photograph available for the corridor. Historically, the corridor appears to have been a combination of marshland, pastureland, agriculture fields and residential. The Plaquemines Parish police training ground is visible on the 1983 aerial photograph.

5.5 Historical Use of Adjoining Properties

Historical use information of adjoining properties was obtained from the review of aerial photographs, historical topographic maps and limited interviews. Highway 23 is present in the 1966 topographic map, as well as the town of Oakville to the north and Levee Road to the east. The west adjacent properties appear as undeveloped marshland. The south adjacent properties were not visible on the 1966 topographic map but appeared to be undeveloped marshland in the 1967 aerial photograph. A water treatment facility is visible to the north starting in the 1983 aerial photograph. The International Marine Terminal and the Conoco-Phillips refinery is visible in the 1973 topographic map and the International Marine Terminal is visible to the east starting in the 1983 aerial photograph.

5.6 Standard Historical Sources Reviewed

5.6.1 Aerial Photograph Review

To evaluate the previous land uses of the property and surrounding area, a series of aerial photographs was reviewed. The aerial photographs provide a progressive overview of parcels pertaining to this assessment.

AEROSTAR personnel reviewed aerial photographs from 1967 (Section 1 only), 1983, and 1994 provided by the National Resources Conservation Service; and an aerial photograph from 2007 obtained from Google Earth. A color copy of the 2002 aerial photograph is provided in Appendix E. Descriptions of AEROSTAR's observations are outlined in Table 4.

TABLE 4A- Section 1
Summary of Aerial Photograph Observations

Source	Photograph Date	Photograph Scale	Remarks
NRCS	1967	NA	Site: Existing non-federal levee, undeveloped marshland, pastureland, agricultural fields and residential North: Undeveloped marshland, agricultural fields and the town of Oakville East: Pasture and agricultural fields, few residential structures, Highway 23, Levee Rd. South: Undeveloped marshland West: Undeveloped marshland
NRCS	1983	NA	Site: No significant change North: No significant change East: No significant change except more residential. South: No significant change West: No significant change

TABLE 4A- Section 1 Summary of Aerial Photograph Observations			
Source	**Photograph Date**	**Photograph Scale**	**Remarks**
NRCS	1994	NA	Site: No significant change North: No significant change East: No significant change. South: No significant change West: No significant change
Google Earth	2007	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change

TABLE 4B- Section 2 Summary of Aerial Photograph Observations			
Source	**Photograph Date**	**Photograph Scale**	**Remarks**
NRCS	1983	NA	Site: Existing non-federal levee, pasture and agricultural fields North: Undeveloped marshland, residential structures, Highway 23 East: Highway 23, Conoco-Phillips Refinery, electric power station, residential structures, pasture and agricultural fields South: Undeveloped marshland West: Undeveloped marshland
NRCS	1994	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change
Google Earth	2007	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change

TABLE 4C- Section 3 Summary of Aerial Photograph Observations			
Source Photograph	**Date**	**Photograph Scale**	**Remarks**
NRCS	1983	NA	Site: Existing non-federal levee, pastureland, agricultural fields, residential, and the Plaquemines Parish Police training grounds and campground North: Highway 23, pasture and agricultural fields, undeveloped forestland, Levee Road, Mississippi River East: Highway 23, Residential, Myrtle Grove Bar, International Marine Terminal, pasture and agricultural fields, undeveloped forestland, Mississippi River South: Undeveloped marshland West: Pasture and agricultural fields
NRCS	1994	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change
Google Earth	2007	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change

TABLE 4D- Section 4 Summary of Aerial Photograph Observations			
Source Photograph	**Date**	**Photograph Scale**	**Remarks**
NRCS	1983	NA	Site: Existing non-federal levee pastureland and agricultural fields North: Highway 23, pastureland and agricultural fields, residential structures, undeveloped forestland, Mississippi River East: Highway 23, undeveloped marshland, and a water treatment facility followed by the Mississippi River, South: Agricultural land and undeveloped marshland West: Agricultural land and undeveloped marshland

TABLE 4D- Section 4 Summary of Aerial Photograph Observations			
Source Photograph	**Photograph Date**	**Photograph Scale**	**Remarks**
NRCS	1994	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change
Google Earth	2007	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change

TABLE 4E- Section 5 Summary of Aerial Photograph Observations			
Source Photograph	**Photograph Date**	**Photograph Scale**	**Remarks**
NRCS	1983	NA	Site: Existing non-federal levee, agricultural land and Highway 23 North: Water treatment facility, undeveloped forestland, pasture and agricultural fields followed by the Mississippi River East: Undeveloped land South: Agricultural land and undeveloped marshland West: Agricultural land and undeveloped marshland
NRCS	1994	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change
Google Earth	2007	NA	Site: No significant change North: No significant change East: No significant change South: No significant change West: No significant change

5.6.2 Property Ownership Records

Property ownership records were not researched for this investigation at the request of the Client. A chain-of-title was not provided to AEROSTAR by the Client or User.

5.6.3 City Directory Review

A historical city directory search was not performed as part of this investigation due to limited availability of research information.

5.6.4 Fire Insurance Map Review

Fire Insurance Maps did not provide coverage for the site.

5.6.5 Other Historical Sources

Topographic Maps

Historical topographic maps from 1966 (Revised 1972 and 1979), 1966 (Revised 1989), 1973 (Minor Revision 1992), 1992, and 1995 of the site area were provided by FTC. Historical topographic maps are included in Appendix E. Descriptions of AEROSTAR's observations are outlined in Tables 5A through 5E.

TABLE 5A - Section 1
Summary of Historical Topographic Map Observations

Source	Map Date	Map Scale	Remarks
FTC	Bertrandville, LA Topographic Quadrangle Map, 1966, Revised 1972 and 1979	1:24,000	Site: The site is undeveloped. The site is bisected east-west by Sarah Canal. North: Undeveloped marshland, a park, and a sandpit are visible, followed by the Hero Canal. The US Naval Air Station (Alvin Callender Field) is visible further north. East: Multiple structures, a trailer park, two cemeteries, and a levee are visible, followed by the Mississippi River. South: Undeveloped marshland. West: Undeveloped marshland, followed by Pipeline Canal and the Intracoastal Waterway. ***The southern half of Section 1 was not available for review.**
FTC	Bertrandville, LA Topographic Quadrangle Map, 1966, Revised 1989	1:24,000	Site: No significant change North: No significant change East: Increased number of structures and urban areas. No other significant changes South: An urban area is visible south of Route 1. West: No significant change ***The southern half of Section 1 was not available for review.**

TABLE 5A - Section 1 Summary of Historical Topographic Map Observations			
Source	**Map Date**	**Map Scale**	**Remarks**
FTC	Phoenix, LA Topographic Quadrangle Map, 1973	1:24,000	Site: Numerous structures and agricultural fields are visible. North: The northern half of Section 1 and the northern adjoining area are not visible on the topographic map. East: Numerous agricultural fields, followed by the Mississippi River. South: Numerous bulk ASTs are visible at the Conoco Philips facility adjacent to Section 2. West: Numerous agricultural fields and marshland are visible. ***The northern half of Section 1 was not available for review.**
FTC	Bertrandville, LA Topographic Quadrangle Map, 1992	1:24,000	Site: A structure is visible in the vicinity of REC 1. Agricultural fields are visible south of Sarah Canal in the vicinity of Route 1A. North: No significant change East: Agricultural fields are visible south of Sarah Canal. Additional structures are visible to the east along the Mississippi River. South: A marshland area or area of standing water is visible south of Route 1. West: No significant change ***The southern half of Section 1 was not available for review.**
FTC	Bertrandville, LA and Lafitte, LA Topographic Quadrangle Maps, 1995	1:24,000	Site: The Ollie Canal and Pipeline Canal bisect the southern half of the site. No significant change was noted on the northern half of the site. North: No significant change East: Multiple structures are visible to the east along the Mississippi River. South: Undeveloped marshland West: Undeveloped marshland

TABLE 5B - Section 2 Summary of Historical Topographic Map Observations			
Source Map	**Name and Date**	**Map Scale**	**Remarks**
FTC	Phoenix, LA Topographic Quadrangle Map, 1973	1:24,000	Site: The site consists of numerous agricultural fields. Numerous structures are also visible along the study area. North: Numerous structures, agricultural fields, and marshland are visible. East: Numerous bulk ASTs are visible at the Conoco Philips facility. Numerous agricultural fields are visible. The Mississippi River is visible further to the east. South: Wilkerson Canal and marshland are visible. West: Agricultural fields and marshlands are visible. Two drill holes are visible further west and to the south.

TABLE 5C - Section 3 Summary of Historical Topographic Map Observations			
Source Map	**Name and Date**	**Map Scale**	**Remarks**
FTC	Phoenix, LA Topographic Quadrangle Map, 1973	1:24,000	Site: The site consists of numerous agricultural fields. Numerous structures are visible north of Wilkinson Canal on either side of the study area. North: Numerous agricultural fields and the Mississippi River are visible. East: Numerous agricultural fields and the Mississippi River are visible. South: Wilkerson Canal, a large pond, and marshland are visible. West: Undeveloped marshland is visible. Two drill holes are visible further to the west.

TABLE 5D - Section 4 Summary of Historical Topographic Map Observations			
Source Map	**Name and Date**	**Map Scale**	**Remarks**
FTC	Lake Laurier, LA and Point A La Hache, LA Topographic Quadrangles 1973, Monor Revision 1992	1:24,000	Site: The site consists of numerous structures and agricultural fields. North: The Mississippi River adjoins Section 4 to the north. East: Numerous bulk ASTs are visible to the east of an unnamed canal. The ASTs appear to be associated with the REC noted in Section 5. South: Lake Judge Perez, numerous unnamed canals, and marshland are visible. West: Undeveloped land and marshland are visible.

TABLE 5E - Section 5 Summary of Historical Topographic Map Observations			
Source Map	**Name and Date**	**Map Scale**	**Remarks**
FTC	Point A La Hache, LA Topographic Quadrangle 1973, Monor Revision 1992	1:24,000	Site: The site consists of numerous structures and agricultural fields. Multiple bulk ASTs are visible adjacent to the north of the northern portion of Section 5. North: Numerous bulk ASTs are visible adjacent to the northern portion of Section 5. East: Numerous structures and agricultural fields are visible. South: Numerous agricultural fields, unnamed canals, and marshland are visible. West: Numerous structures and agricultural fields are visible.

6.0 SITE RECONNAISSANCE

6.1 Methodology and Limiting Conditions

Visual and physical inspections conducted as part of this investigation included an inspection of properties from the levee right-of-way. Additionally, observations of access to and egress from the site were noted, as well as the presence and condition of any on-site buildings, utilities, or other improvements. AEROSTAR was not provided access to the interior of the site buildings at the time of the inspection. This visual and physical inspection of the site focused primarily on its surface features. Property use and significant features are indicated on the Site Location Maps which are included as Figures 4A – 4D in Appendix A. Site photographs are included in Appendix C.

6.2 General Site Setting

6.2.1 Current Use(s) of the Site

The site consists of undeveloped marsh and swampland, developed pastureland, residential structures, several pump stations, an electrical power station, and Plaquemines Parish Sheriff Training Center/ Campground. Several residential structures, Express Food and Fuel, Conoco-Phillips Oil Refinery, International Marine Terminals, and a water treatment plant are located adjoining to the subject site area directly across Highway 23. A marina in Myrtle Grove is located north of the Wilkinson Canal Pump Station; however it is not included within the boundary of the subject site. All observations of the properties located on the subject site were made from the existing levee system or public roads.

6.2.2 Past Use(s) of the Site

The northern portion of the corridor appears to have been primarily undeveloped marshland located along the non-federal levee, with pastureland, agricultural and light residential uses noted along the levee. The middle portion of the corridor has historically been used as pastureland and marshland, with some commercial, industrial and residential usage. The southern portion of the corridor appears to have been pastureland and agricultural fields along the non-federal levee.

6.2.3 Current Uses of Adjoining Properties

Several residential structures, agricultural properties, Express Food and Fuel, Conoco-Phillips Oil Refinery, International Marine Terminals, and a water treatment plant are located adjoining to the subject site area directly across Highway 23. A marina in Myrtle Grove is located north of the Wilkinson Canal Pump Station; however it is not included within the boundary of the subject site. The Mississippi River lies to the east of Highway 23.

6.2.4 Past Uses of Adjoining Properties

The adjoining properties appeared to have been undeveloped forest or swampland and residential and agricultural properties. Conoco- Phillips has been adjoining to the subject site since 1971. International Marine Terminals has been adjoining to the subject site since 1977.

6.2.5 Current or Past Uses in the Surrounding Area

The surrounding area is currently used for commercial residential and agricultural purposes. No other indication of the surrounding area's past use was observed during the site reconnaissance.

6.2.6 Geologic, Hydrogeologic, Hydrologic, and Topographic Conditions

The site appears to have little or no discernable slope. However, due to its close proximity to the Mississippi River which is located east and north of the site, groundwater flow is likely to be to the west or southwest, away from the Mississippi River towards the marsh/swamp.

6.2.7 General Description of Structures

The site is developed with several commercial and residential structures. The structures consist of brick faced and wood framed residential structures, mobile homes, and metal and concrete block commercial structures.

6.2.8 Roads

Highway 23 is located east and north of the site and is included in the subject site area from GPS point 29°41'59.88"N/ 89°59'14.94"W (north of Conoco-Phillips Oil Refinery) to the end of the southeastern boundary of the subject site at GPS point 29°32'36.32"N / 89°46'44.94"W. West Ravenna Road traverses in an east-west direction from GPS point 29°40'07.21"N / 89°58'38.23"W to GPS point 29°39'27.62"N / 90°00'36.59"W through section 2 of the subject site.

6.2.9 Potable Water Supplies

Potable water is provided to the site area by Plaquemines Parish Water Department.

6.2.10 Sewage Disposal System

Sewage disposal is provided to the site area by Plaquemines Parish and private septic systems.

6.2.11 Other Conditions of Concern

No other conditions of concern were noted during the site investigation.

6.3 Exterior Observations

6.3.1 Hazardous Substances and Petroleum Products

All observations of the properties located on the subject site were made from the existing levee system or public roads. One AST was observed on residential property at GPS point 29˚46′41.61″N, -90˚01′52.87″W; four ASTs were observed at the Ollie Pump Station, GPS Point 29˚44′19.61″N, -90˚01′18.85″W; three ASTs were observed at the Wilkinson Canal Pump Station, GPS Point 29˚37′17.21″N, -89˚57′13.11″W; three ASTs were observed at the Plaquemines Parish Sheriff's Office Training Center/ Campground, GPS 29˚37′32.88″N, -89˚56′12.57″W; one AST was observed at the Myrtle Grove Marina, GPS 29˚37′55.43″N, -89˚57′06.88″W; one AST was observed at the Belle Chase Marine Transfer facility, GPS 29˚35′55.96″N, -89˚051′05.19″W; one AST was observed at the Elkland facility, GPS 29˚35′41.54″N, -89˚50′48.52″W; one AST was observed at residential farmland, GPS 29˚35′05.71″N, -89˚51′16.50″W; two ASTs were observed at a pump station, GPS 29˚34′46.45″N, -89˚51′23.72″W; and one AST was observed at residential farmland, GPS 29˚34′43.26″N, -89˚49′27.77″W. The tanks were observed to be approximately 100- 2000 gallons in size and appeared to be labeled as diesel. All ASTs were constructed on metal skids.

6.3.2 Storage Tanks

See Section 6.3.1. No other storage tanks were observed during the site inspection; however, limited access was provided to sites along the corridor and additional storage tanks may exist that were not readily apparent from the levee right-of-way.

6.3.3 Odors

No odors were noted during the site inspection.

6.3.4 Pools of Liquids

No pools of liquids were observed during the site inspection.

6.3.5 Drums

No other drums were observed during the site inspection; however, limited access was provided to sites along the corridor and additional drums may exist that were not readily apparent from the levee right-of-way.

6.3.6 Unidentified Substance Containers

See Section 6.3.1

6.3.7 PCBs

Several pole mounted transformers were observed within and adjoining the subject site area. All transformers appeared to be in good condition and are owned and maintained by Entergy.

6.3.8 Pits, Ponds or Lagoons

Low-lying areas associated with the adjacent marshland were observed along the corridor. Several surface impoundments that appeared to be man-made were also observed with Section 4 of the corridor.

6.3.9 Stained Soil or Pavement

No stained soil or pavement was observed during the site inspection.

6.3.10 Stress ed Vegetation

No stressed vegetation was observed during the site inspection.

6.3.11 Solid Waste

Indiscriminate dumping of industrial pipes and lights were observed in a field along Section 3 of the subject site. The pipes and lights appeared to have been dumped at the site in the past.

6.3.12 Waste Water

No waste water discharges to or from the site were observed during the site inspection.

6.3.13 Wells

See Section 6.3.1

6.3.14 Septic Systems

Several residential septic systems were observed within the corridor.

6.3.15 Other Conditions of Concern

No other conditions of concern were noted.

6.4 Interior Observations

6.4.1 Hazardous Substances and Petroleum Products

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.2 Storage Tanks

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.3 Odors

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.4 Pools of Liquid

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.5 Drums

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.6 Unidentified Substance Containers

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.7 PCBs

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.8 Heating and Cooling

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.9 Stains or Corrosion

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.10 Drains and Sumps

The interiors of buildings along the corridor were not accessed during the site inspection.

6.4.11 Other Conditions of Concern

The interiors of buildings along the corridor were not accessed during the site inspection.

7.0 INTE RVIEWS

AEROSTAR contacted individuals familiar with the site, as well as local, state, tribal or federal agency representatives, where available, regarding issues which could have an adverse effect on the environmental status of the site. Copies of interview documentation are included as Appendix F.

7.1 Interview with Site Owner

Interviews were not conducted with individual site owners as part of the scope of work

7.2 Interview with Site Manager

Interviews were not conducted with individual site managers as part of the scope of work

7.3 Interviews with Occupants

Mr. Rocky Buras, an employee of Citrus Lands, was contacted via telephone regarding the presence of current and historical USTs on Citrus Land property. Mr. Buras stated that two leaking USTs, one diesel and one gasoline, were removed from Citrus Lands property approximately 15 years ago, and that sampling and remediation was conducted by LDEQ.

7.4 Interviews with Local Government Officials

AEROSTAR called the Belle Chasse/Plaquemines Parish Fire Department, but our telephone call was not returned in time for this report.

7.5 Interviews with Others

Ms. Zina Thomas, an employee of International Marine Terminals, was contacted via telephone regarding the presence of current and historical USTs and/or water monitoring wells on the site. Ms. Thomas stated that there are no USTs currently or historically on the site. She also stated that several water monitoring wells are present on the property, but was unclear as to the number and location of the wells.

8.0 FINDINGS AND OPINIONS

8.1 Known or Suspect Recognized Environmental Conditions

- REC 1 (29˚46´41.61″N, -90˚01´52.87″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST observed on residential property.

- REC 2 (29º 46' 52.67" N, -90º 2' 33.36" W) Onsite concerns were noted from the historical presence of a petroleum production well.

- REC 3 (29˚44´19.61″N, -90˚01´18.85″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs at Ollie Pump Station.

- REC 4 (29˚40´55.33″N, -89˚58´31.25″W) Offsite concerns were noted from the adjacent Conoco- Phillips Oil Refinery.

- REC 5 (29˚40´18.80″N, -90˚00´31.44″W) Onsite concerns were noted from a petroleum transfer station located along the corridor.

- REC 6 (29˚37´17.21″N, -89˚57´13.11″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs at Wilkinson Canal Pump Station.

- REC 7A (29˚37´37.11″N, -89˚56´06.96″W) Onsite concerns were noted from the use of the site for target shooting.

- REC 7B (29˚37´32.88″N, -89˚56´12.57″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs located at Plaquemines Parish Sheriff's Office Training Center/ Campground.

- REC 7C (29˚37´28.23″N, -89˚56´31.16″W) Onsite concerns were noted from nuisance dumping of industrial-use pipes and lights.

- REC 8 (29˚37'55.43"N, -89° 57'06.88"W) Offsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with a diesel AST at the Myrtle Grove Marina.

- REC 9 (29˚37'21.97"N, -89° 55'11.17"W) Offsite concerns were noted from the operations of International Marine Terminal.

- REC 10 (29˚35´55.96″N, -89˚51´05.19″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST observed on Belle Chasse Marine Transfer Terminal.

- REC 11 (29˚35´41.54″N, -89˚50´48.52″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs located at Celeste Therapeutic Riding Center.

- REC 12 (29˚35´05.71″N, -89˚51´16.50″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST located in the middle of a pasture.

- REC 13 (29˚34´46.45″N, -89˚51´23.72″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with three diesel ASTs at the pump station.

- REC 14 (29˚34´43.26″N, -89˚49´27.77″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST located in the middle of a pasture.

- REC 15 (29˚34´23.18″N, -89˚48´30.75″W) Onsite concerns were noted from the the storage and use of petroleum products and/or hazardous materials associated with the operation of a petroleum pipeline.

- REC 16 (29˚34´15.81″N, -89˚48´15.74″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with the operation of the Plaqumine Parish Water Treatment facility.

- REC 17 (throughout corridor) Onsite and offsite concerns were noted from the current and historical uses of herbicides and pesticides associated with agricultural land.

8.2 Historical Recognized Environmental Conditions

No historical recognized environmental conditions were noted in connection with the subject property

8.3 *De Minimis* Conditions

No *de minimis* conditions were noted in connection with the subject property.

9.0 C ONCLUSIONS

AEROSTAR has performed a Phase I ESA in conformance with the scope and limitations of ASTM Standard E 1527-05 of the Plaquemines Parish Non-Federal Levee Project, Plaquemines Parish, Louisiana. Any exceptions to, or deletions from, this practice are described in Section 2 of this report. This assessment has revealed no evidence of recognized environmental conditions in connection with the site, except for the following:

- REC 1 (29˚46´41.61″N, -90˚01´52.87″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with an AST observed on residential property.

- REC 2 (29º 46' 52.67” N, -90º 2' 33.36” W) Onsite concerns were noted from the historical presence of a petroleum production well.

- REC 3 (29˚44´19.61″N, -90˚01´18.85″W) Onsite concerns were noted from the storage and use of petroleum products and/or hazardous materials associated with ASTs at Ollie Pump Station.

- REC 4 (29˚40´55.33″N, -89˚58´31.25″W) Offsite concerns were noted from the adjacent Conoco- Phillips Oil Refinery.

- REC 5 (29˚40´18.80″N, -90˚00´31.44″W) Onsite concerns were noted from a petroleum transfer station located along the corridor.

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- REC 7A (29˚37´37.11″N, -89˚56´06.96″W) Onsite concerns were noted from the use of the site for target shooting.

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- REC 17 (throughout corridor) Onsite and offsite concerns were noted from the current and historical uses of herbicides and pesticides associated with agricultural land.

10.0 DEVI ATIONS

AEROSTAR prepared this Phase I ESA in accordance with ASTM Standard E 1527-05.

11.0 A DDITIONAL SERVICES

Under the terms of the agreement between Client and AEROSTAR, no additional services were provided in association with the Phase I ESA. There may be environmental issues or conditions at a site that the Client may wish to assess in connection with commercial real estate that are outside the scope of this practice (the non-scope considerations). No implication is intended as to the relative importance of inquiry into such non-scope considerations, and this list of non-scope considerations is not intended to be all inclusive: asbestos-containing materials; radon; lead-based paint; lead in drinking water; wetlands; regulatory compliance; cultural and historical resources; industrial hygiene; health and safety; ecological resources; endangered species; indoor air quality; and high voltage power lines.

12.0 REFER ENCES

References reviewed during the Phase I ESA are documented in Appendix G.

13.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

This is to certify the Phase I ESA Report of the Plaquemines Parish Non-Federal Levee Project, Plaquemines Parish, Louisiana, has been examined by the undersigned.

DATE: July 7, 2009 SIGNATURE: _____

Paul M. Fitch, P.E.,
Senior Project Manager

DATE: July 7, 2009 SIGNATURE: _____

K. Dawn Blackledge, P.G.,
Senior Project Manager

14.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

This assessment was completed by Robert Boudet, Senior Project Manager and reviewed by Dawn Blackledge, P.G., Senior Project Manager, both employees of AEROSTAR. We declare that, to the best of our professional knowledge, we meet the definition of environmental professional as defined in § 312.10 of 40 CFR 312. We have the specific qualifications based on education, training, and experience to assess the property of a nature, history, and setting of the site. We have developed and performed the all appropriate inquiries in conformance with the standards set forth on 40 CFR Part 312. Qualifications of personnel participating in this assessment are provided in Appendix H.

APPENDICES

APPENDIX A

FIGURES

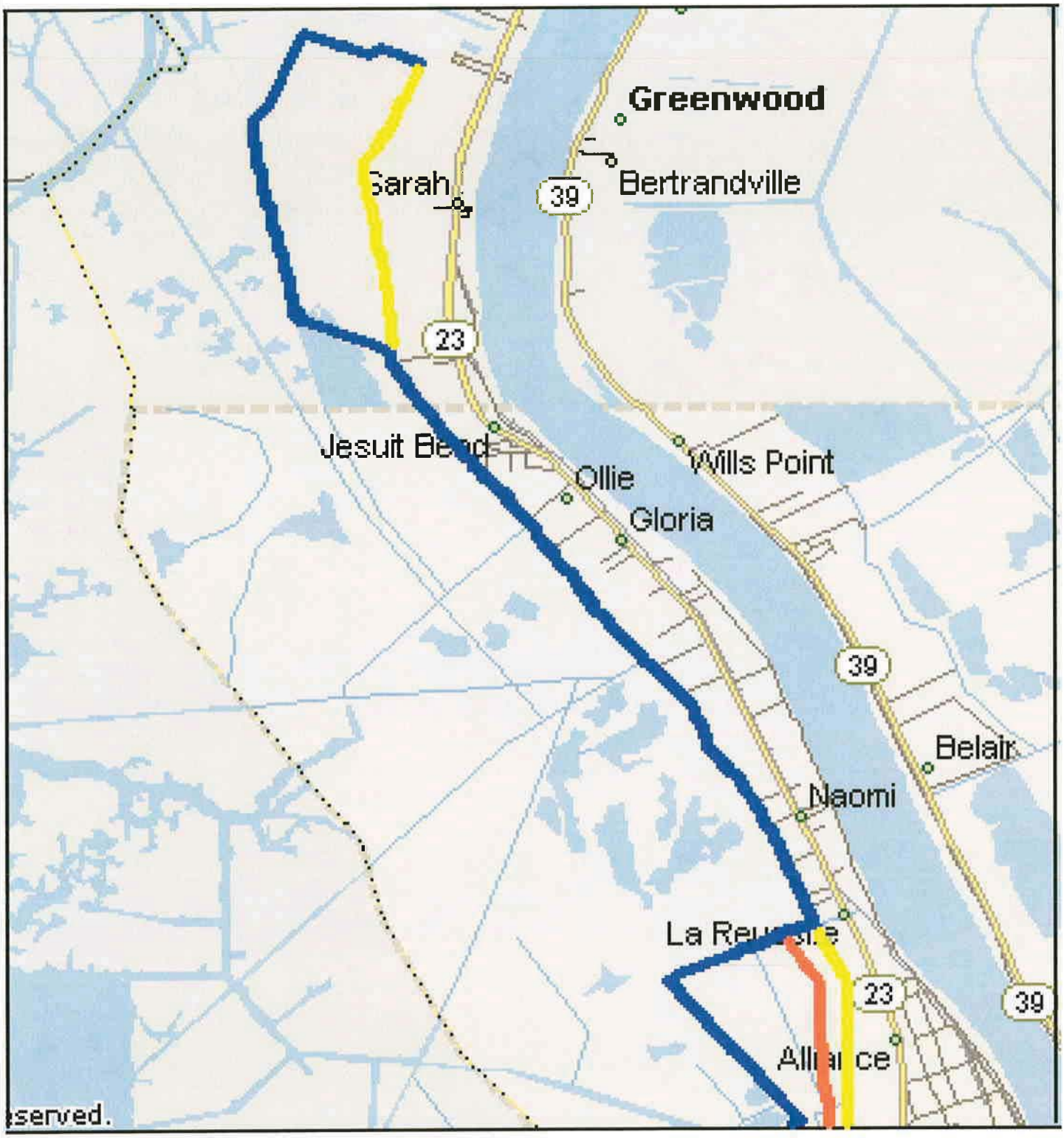


FIGURE 1A. STREET SITE LOCATION MAP- SECTION 1

AEROSTAR ENVIRONMENTAL SERVICES, INC.	NON-FEDERAL LEVEE PROJECT OAKVILLE TO ST. JUDE PLAQUEMINES PARISH, LOUISIANA	DRAWN BY: AVC REFERENCE: MAP OF PLAQUEMINES PARISH LOUISIANA PREPARED BY: THE MICROSOFT CORP.

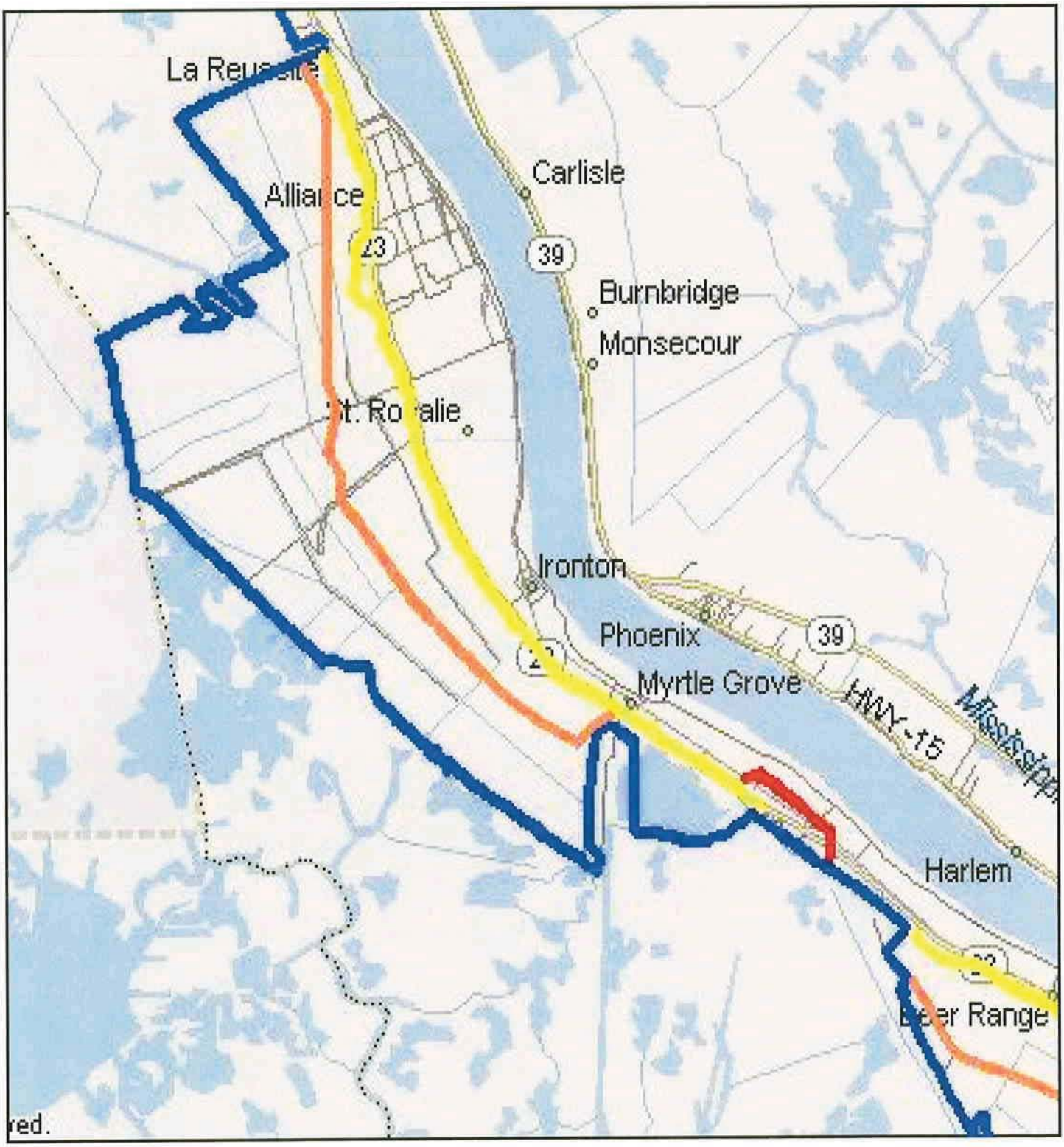


FIGURE 1B. STREET SITE LOCATION MAP- SECTION 2

AEROSTAR ENVIRONMENTAL SERVICES, INC.	NON-FEDERAL LEVEE PROJECT OAKVILLE TO ST. JUDE PLAQUEMINES PARISH, LOUISIANA	DRAWN BY: AVC REFERENCE: MAP OFPLAQUEMINES PARISH, LOUISIANA PREPARED BY: THE MICROSOFT CORP.

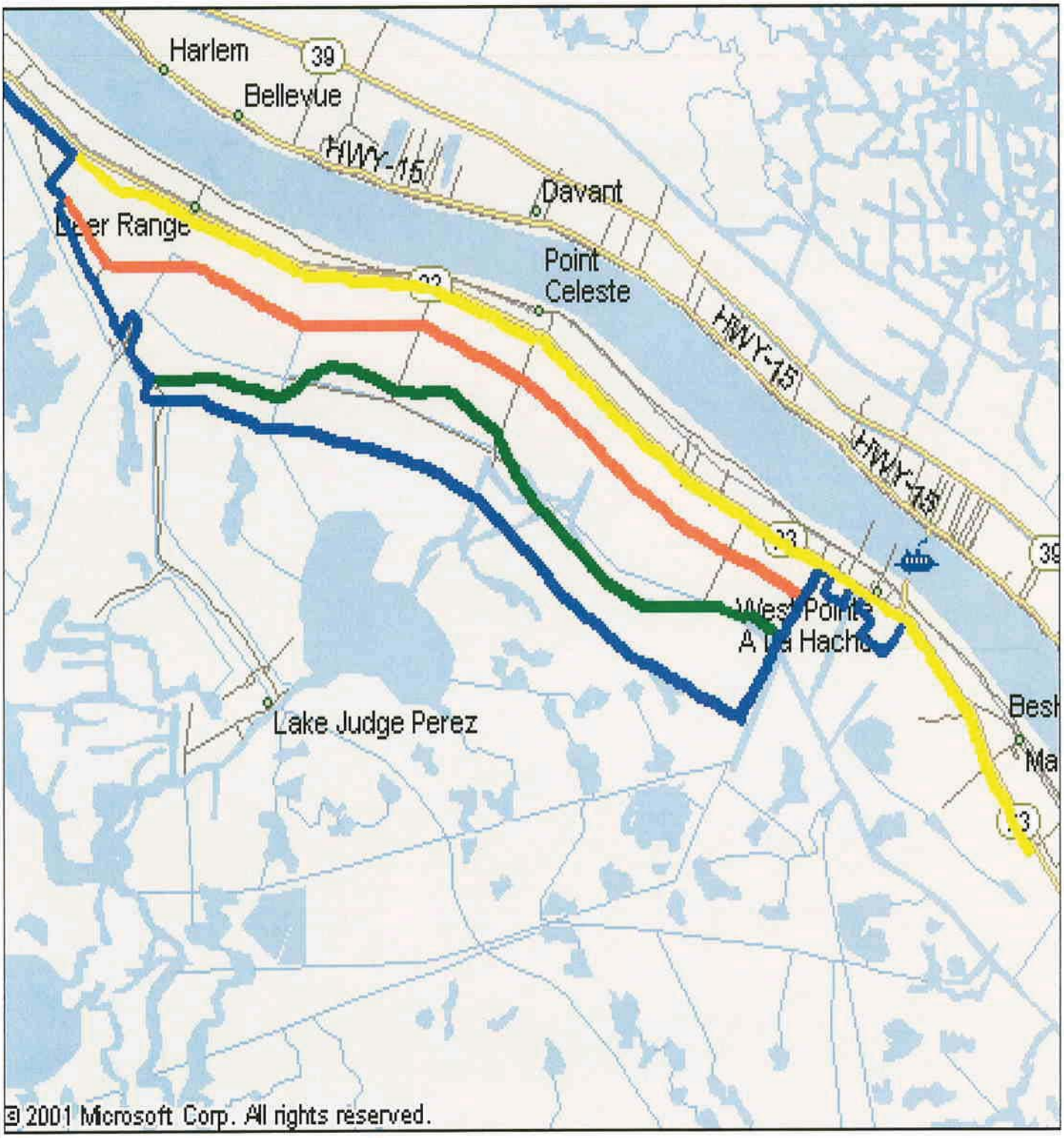


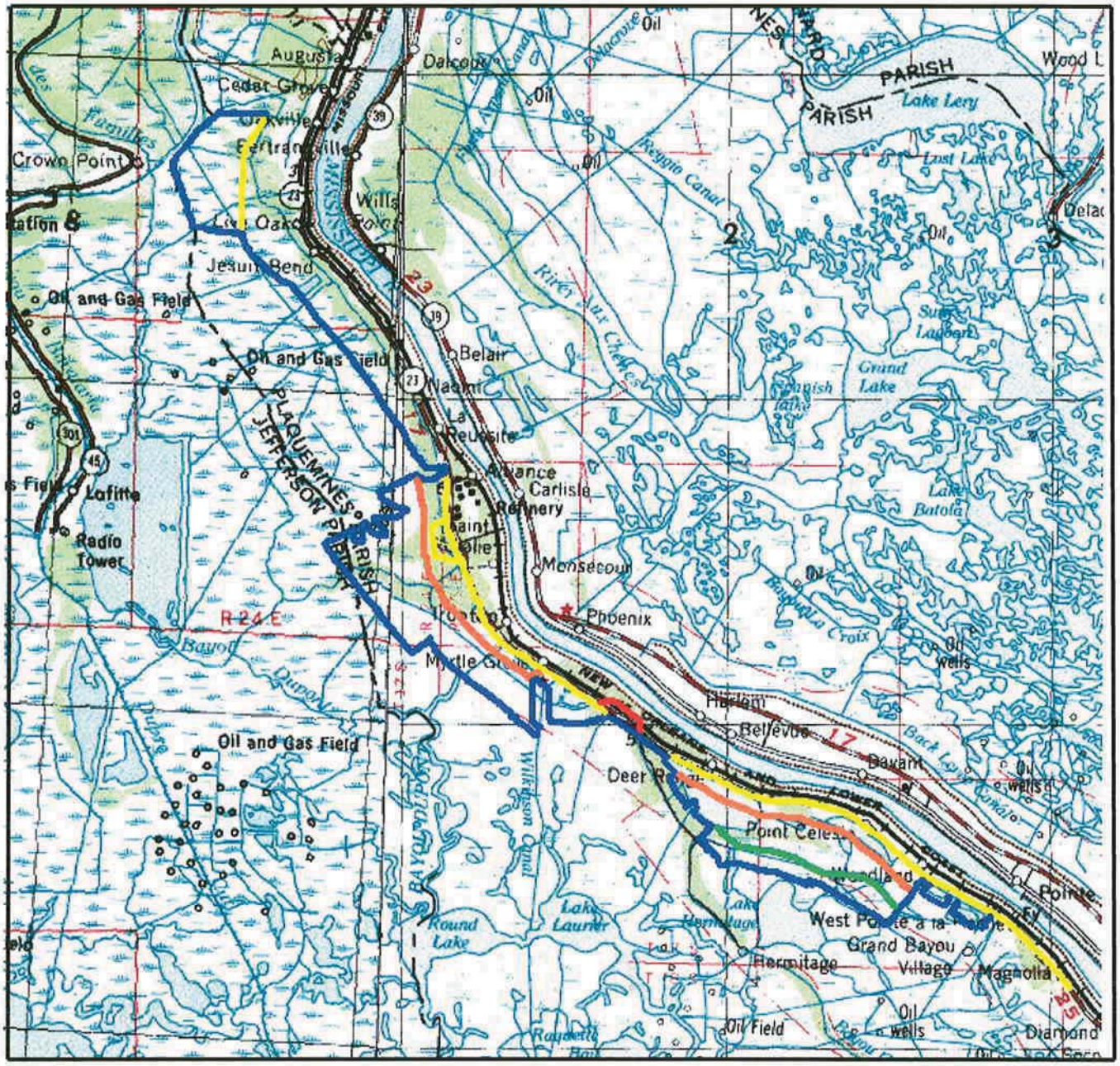
FIGURE1C. STREET SITE LOCATION MAP- SECTION 3

AEROSTAR ENVIRONMENTAL SERVICES, INC.

NON-FEDERAL LEVEE PROJECT
OAKVILLE TO ST. JUDE
PLAQUEMINES PARISH, LOUISIANA

DRAWN BY: AVC

REFERENCE: MAP OFPLAQUEMINES PARISH, LOUISIANA
PREPARED BY: THE MICROSOFT CORP.



USGS PHOENIX QUADRANGLE
DATED 1983

7.5 MINUTE SERIES
(TOPOGRAPHIC)

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1927

QUADRANGLE LOCATION

FIGURE 2. TOPOGRAPHIC SITE LOCATION MAP

AEROSTAR
ENVIRONMENTAL SERVICES, INC.

NON-FEDERAL LEVEE PROJECT
OAKVILLE TO ST. JUDE
PLAQUEMINES PARISH, LOUISIANA

DRAWN BY: AVC

REFERENCE: MAP OF OAKVILLE TO ST. JUDE, LOUISIANA
PREPARED BY: U.S. GEOLOGICAL SURVEY

FIGURE 3. SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.	NON-FEDERAL LEVEE PROJECT OAKVILLE TO ST. JUDE PLAQUEMINES PARISH, LOUISIANA	DRAWN BY: JT REFERENCE: MAP OF PLAQUEMINES PARISH, LA PREPARED BY: THE MICROSOFT CORP.

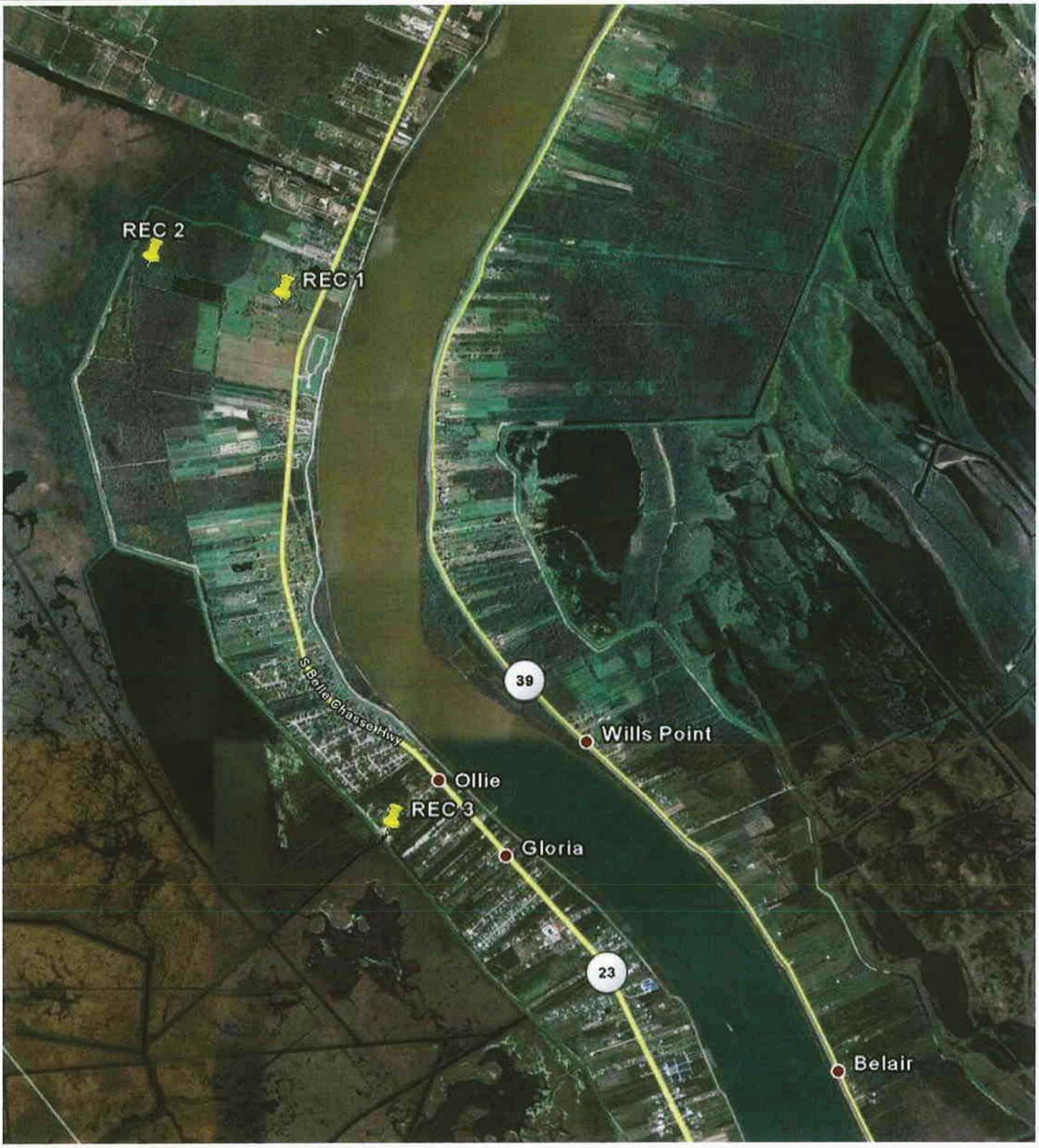


FIGURE 3A. SECTION 1 SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.

NON-FEDERAL LEVEE PROJECT
OAKVILLE TO ST. JUDE
PLAQUEMINES PARISH, LOUISIANA

DRAWN BY: JT

REFERENCE: MAP OF PLAQUEMINES PARISH, LA
PREPARED BY: THE MICROSOFT CORP.

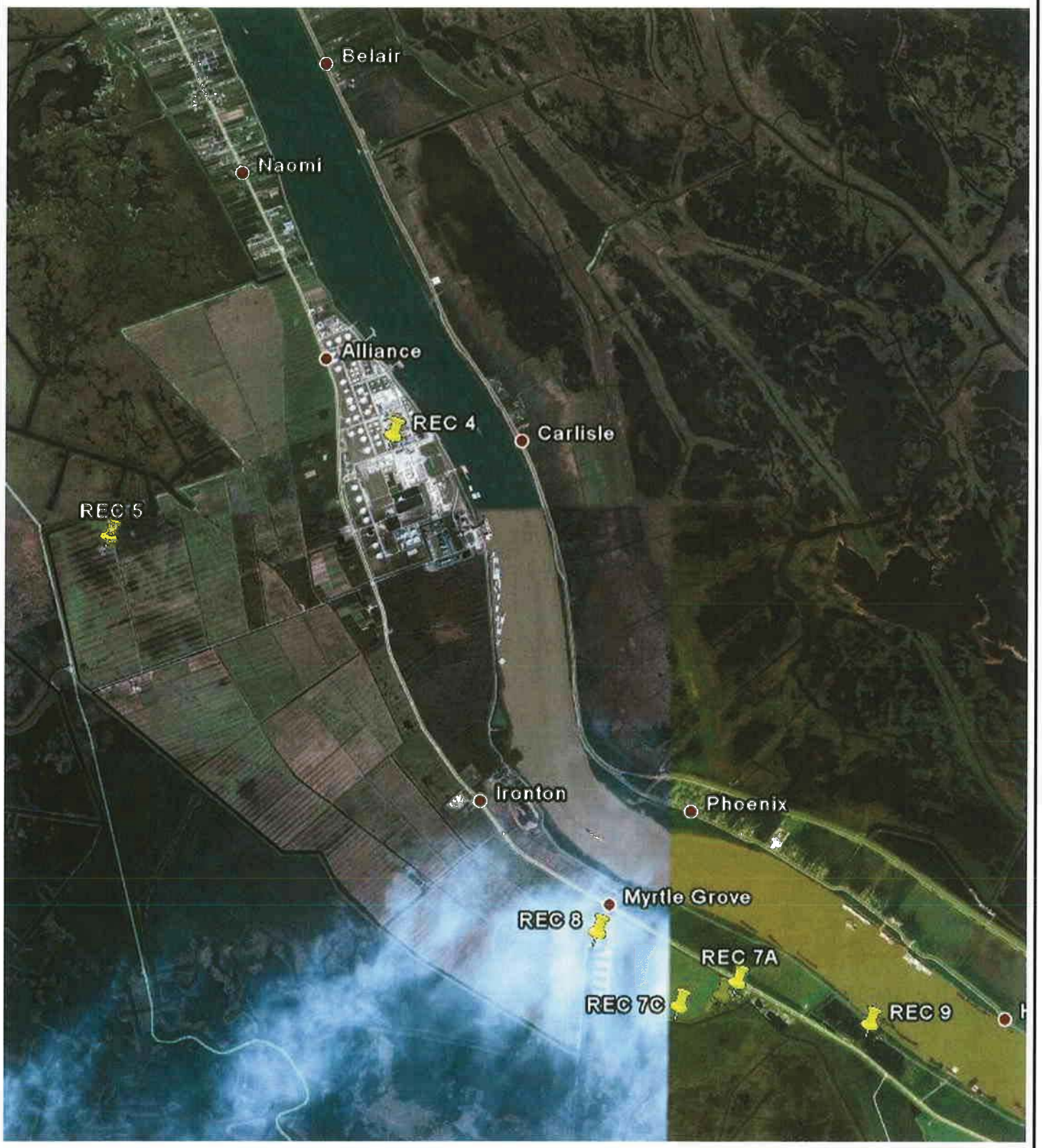


FIGURE 3B. SECTION 2 SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.

NON-FEDERAL LEVEE PROJECT
OAKVILLE TO ST. JUDE
PLAQUEMINES PARISH, LOUISIANA

DRAWN BY: JT

REFERENCE: MAP OF PLAQUEMINES PARISH, LA
PREPARED BY: THE MICROSOFT CORP.

FIGURE 3C. SECTION 3 SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.	NON-FEDERAL LEVEE PROJECT OAKVILLE TO ST. JUDE PLAQUEMINES PARISH, LOUISIANA	DRAWN BY: JT REFERENCE: MAP OF PLAQUEMINES PARISH, LA PREPARED BY: THE MICROSOFT CORP.

FIGURE 3D. SECTION 4 SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.	NON-FEDERAL LEVEE PROJECT OAKVILLE TO ST. JUDE PLAQUEMINES PARISH, LOUISIANA	DRAWN BY: JT REFERENCE: MAP OF PLAQUEMINES PARISH, LA PREPARED BY: THE MICROSOFT CORP.

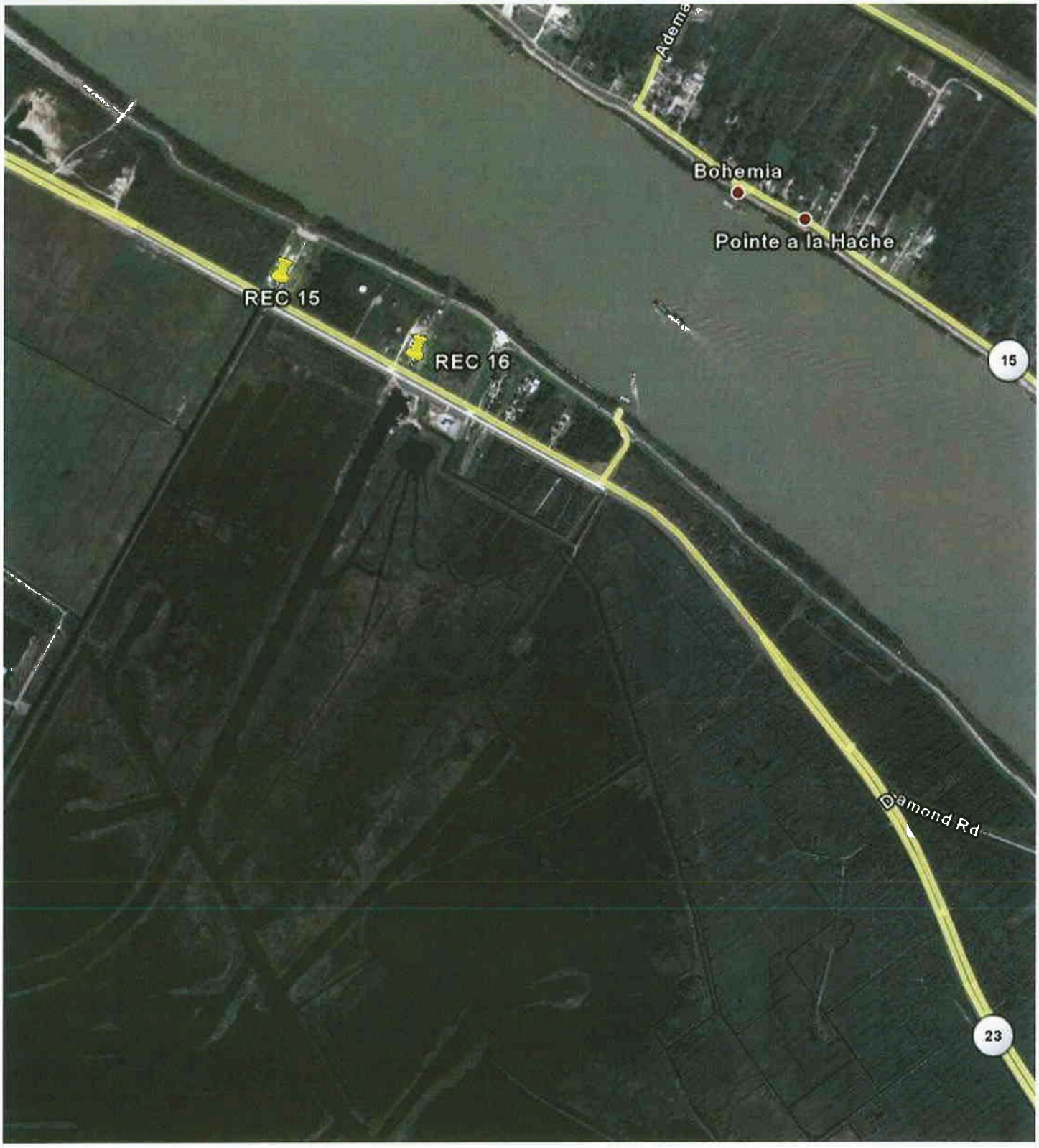


FIGURE 3E. SECTION 5 SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.

NON-FEDERAL LEVEE PROJECT
OAKVILLE TO ST. JUDE
PLAQUEMINES PARISH, LOUISIANA

DRAWN BY: JT

REFERENCE: MAP OF PLAQUEMINES PARISH, LA PREPARED BY: THE MICROSOFT CORP.

APPENDIX B

PROPERTY RECORD INFORMATION

PROPERTY RECORD INFORMATION

Due to the number of properties along the corridor, site specific property record cards are not provided.

APPENDIX C

SITE PHOTOGRAPHS

Section 1-
Routes 1 and 1A

1) Barn on adjoining property (citrus farm) east of route 1A.

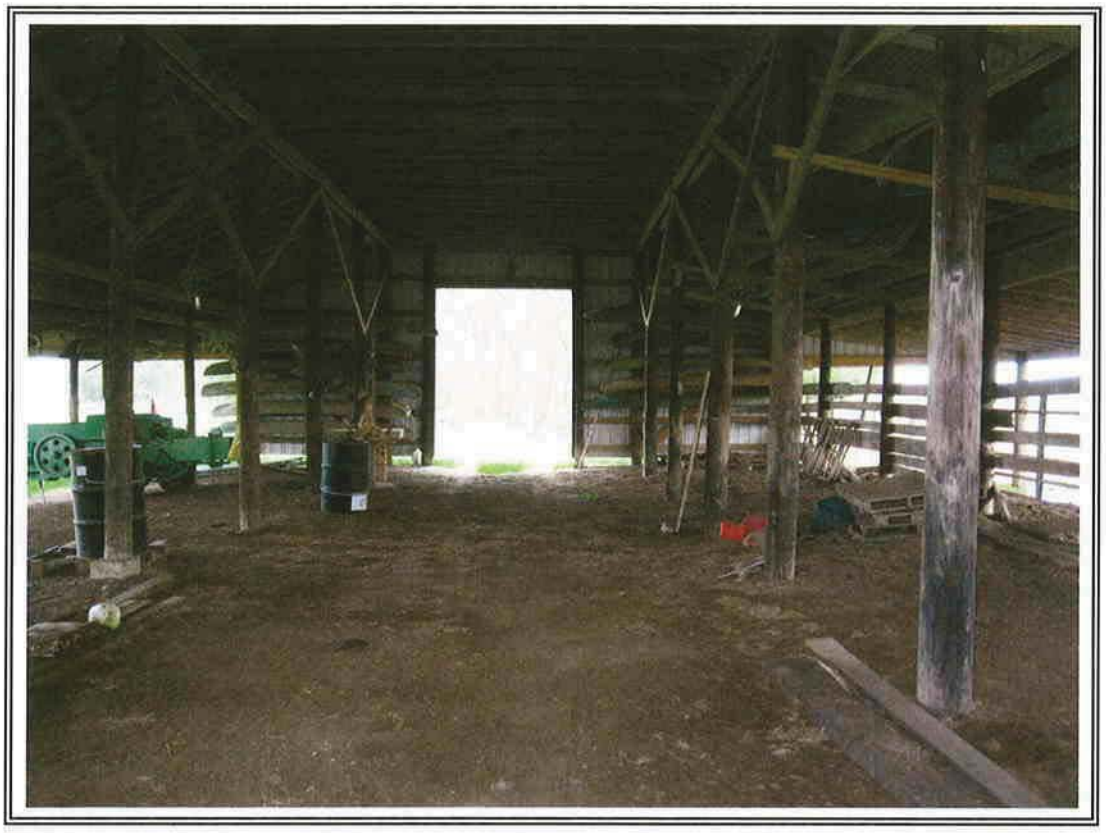
2) Fuel tank on adjoining property east of route 1A.

3) House on adjoining property east of route 1A.

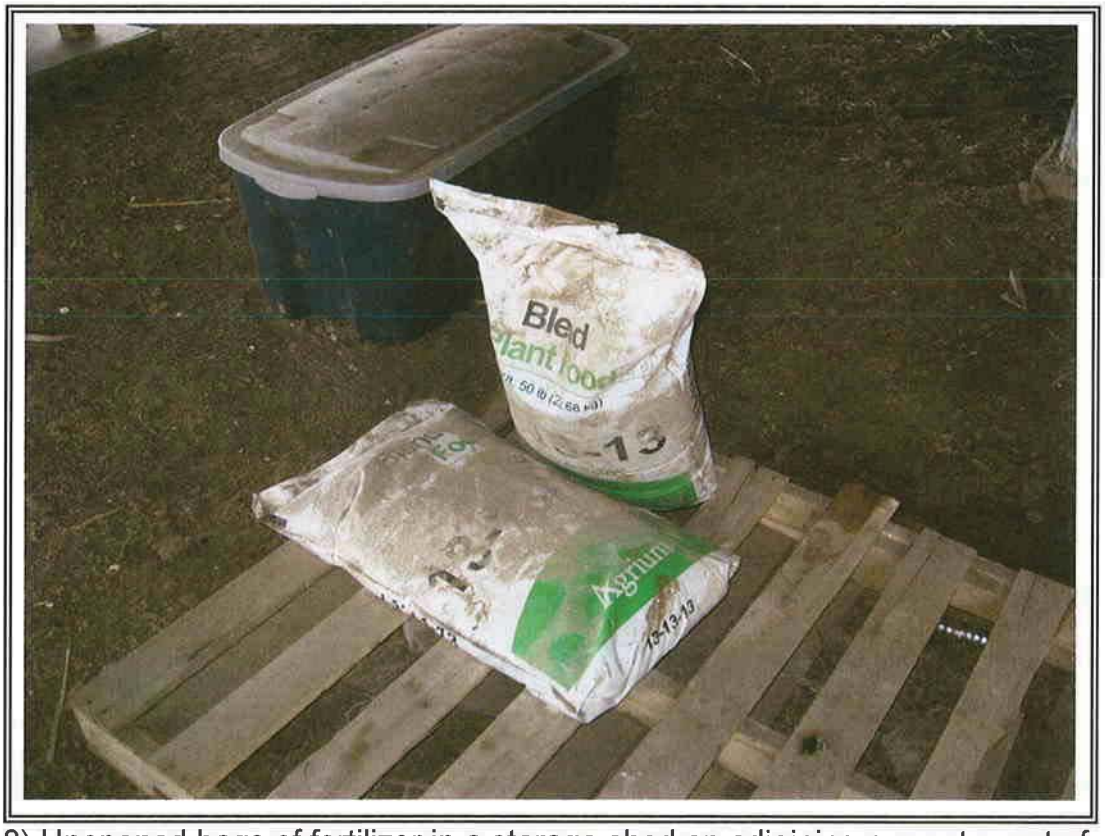
4) Looking south along the boundary of route 1A from the north.

5) Bison in a field along route 1A.

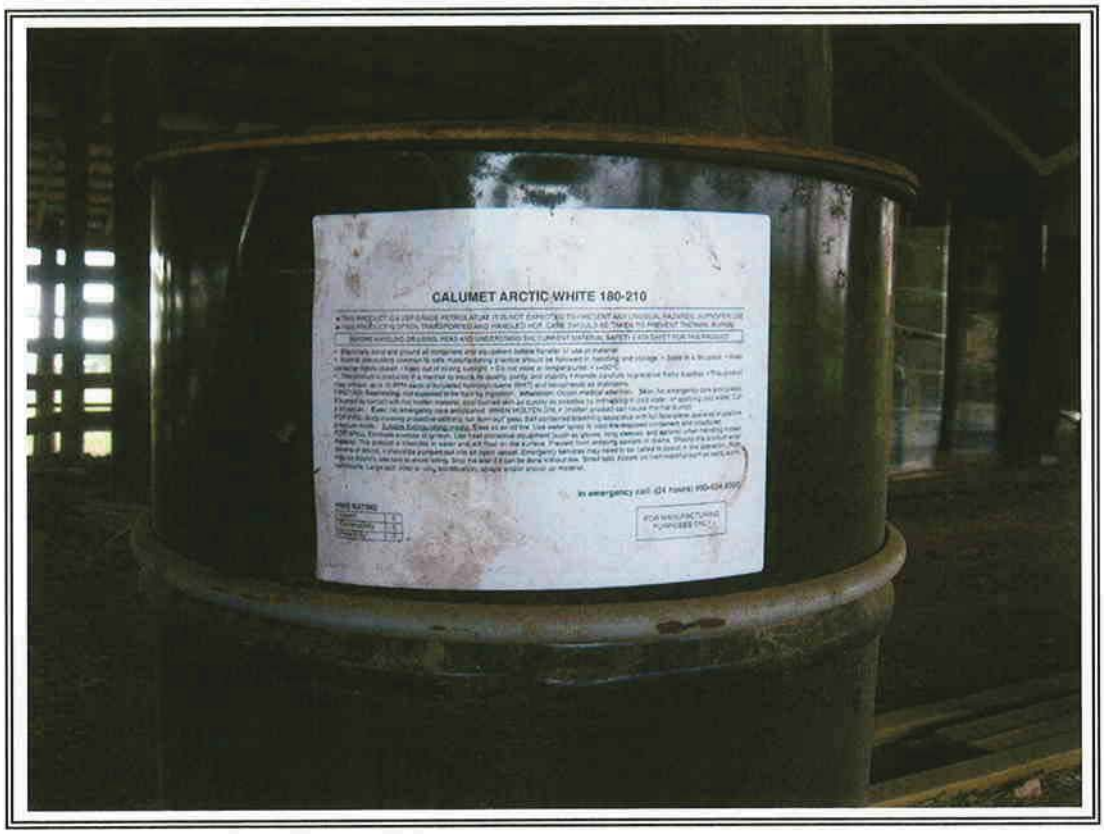
6) A storage shed located on adjoining property east of route 1A.



7) Storage shed on adjoining property east of route 1A.



8) Unopened bags of fertilizer in a storage shed on adjoining property east of route 1A.



9) Empty 55-gallon drum of Calumet in storage shed east of route 1A.

10) Looking toward the west from route 1A.

11) A shed containing pesticides, herbicides, and fertilizer located on adjoining property east of route 1A.

12) A drum located in storage shed east of route 1A.

13) Looking toward the north at a canal that runs along the east side of the western boundary of route 1.

14) Looking from the northwestern boundary of the existing levee route 1 toward the northwest at a wetland area. (s1)

15) Looking toward the south-southeast from the northwest boundary of route 1.

16) FEMA trailer park next to northern boundary of subject site (route 1).

17) Looking south along route 1A from northernmost boundary.

18) Looking at a property south of West Ravenna Road.

19) Asbestos sheets south of West Ravenna Road.

20) A horse corral located north of West Ravenna Road.

21) A property containing trailers, boats, and construction equipment to the north of West Ravenna Road.

22) A fishing camp located to the west of route 1.

23) Natural gas pipelines running through the swamp to the west of route 1.

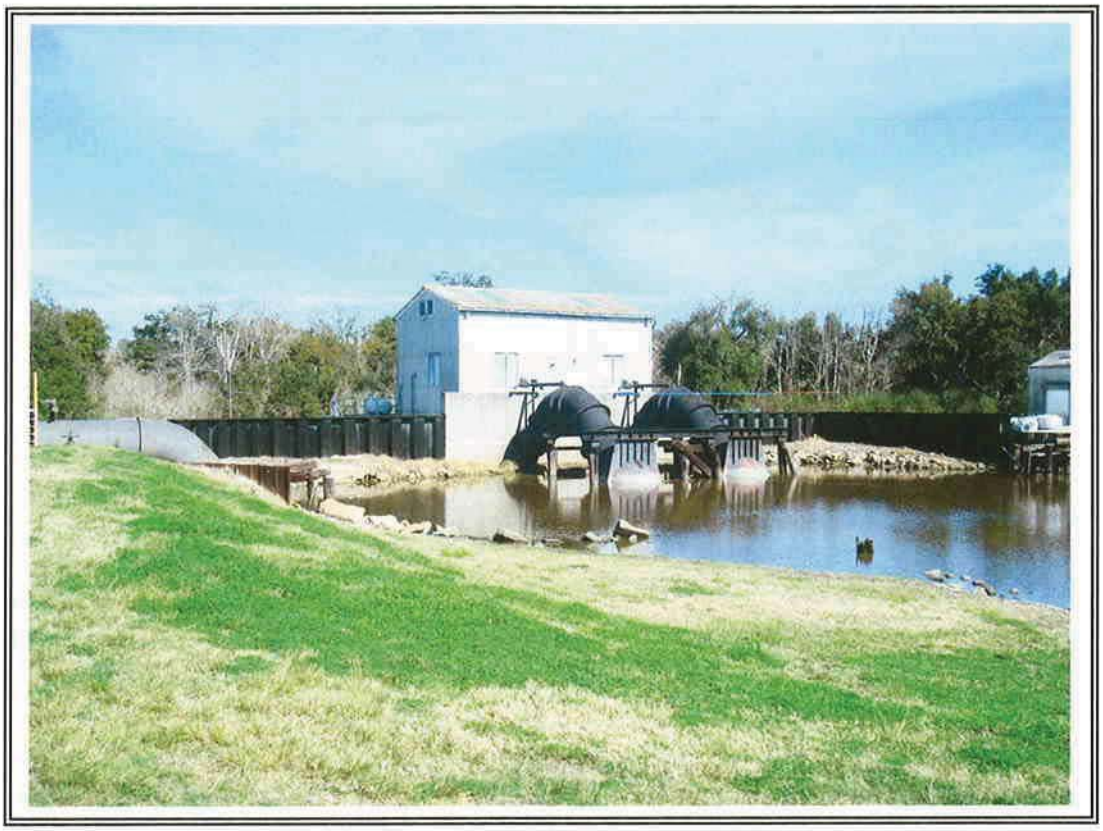
24) Natural gas pipelines running through the swamp to the west of route 1.

25) An abandoned trailer at end of Kildee Lane, east of the existing non-federal levee.

26) Looking at the existing non-federal levee and canal north of Kildee Lane.

27) Looking at the existing non-federal levee and canal to the southwest of Riverbend Drive.

28) Looking south along levee from the Ollie Pump Station.



29) Ollie Pump Station (including small AST).

30) Two ASTs at Ollie Pump Station.

31) Looking west at the property at the end of Barthelemy Lane, including two unidentified 55-gallon drums.

32) Looking west from Jason Drive at the existing non-federal levee.

Section 2-
Routes 2, 2A, 2A1 and 2B

1) Looking west at a drainage canal on Highway 23 at the north end of the site.

2) Looking east at Langridge Wholesale Plant Nursery, located at 14655 Highway 23.

3) Looking east at Express Food and Fuel, located at 14715 Highway 23.

4) Looking west at the site of a former car wash next to a residential trailer park off of Highway 23.

5) Looking east at Ben Becnel's greenhouses and produce stand, located at 14977 Highway 23.

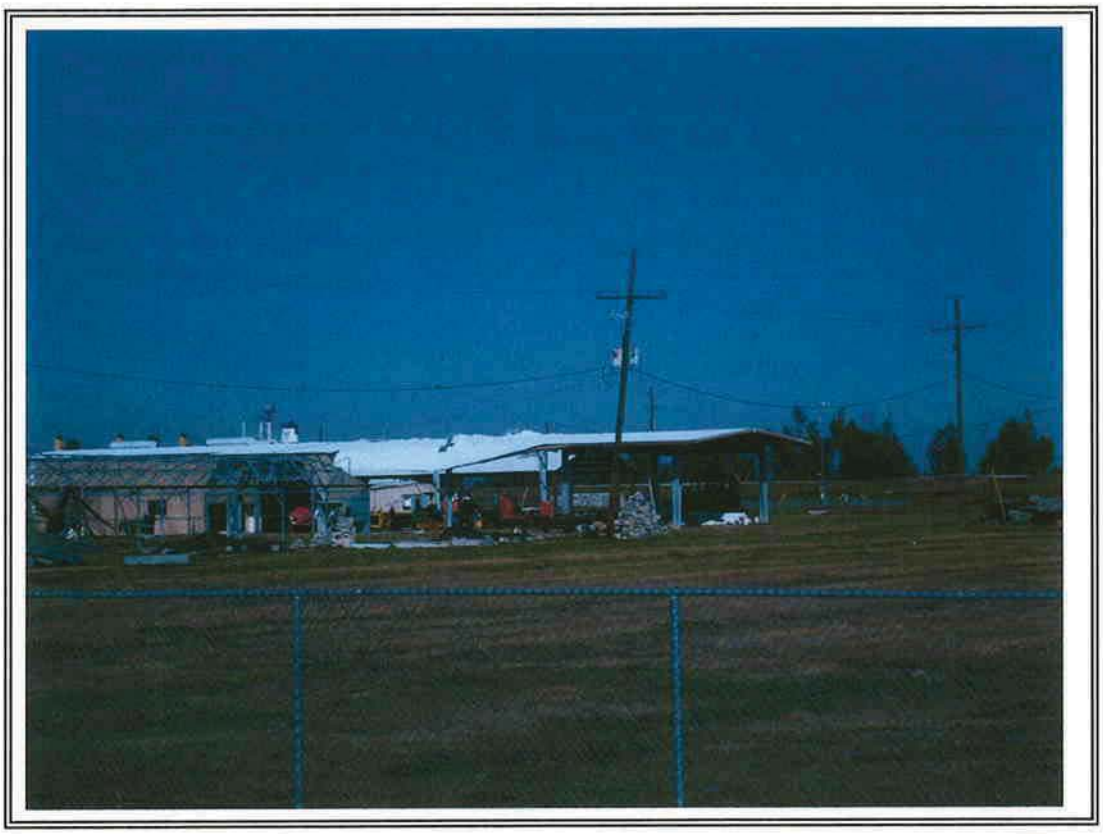
6) Looking east at the northern end of the Conoco-Phillips Refinery on Hwy 23.

7) Looking at a cow pasture across Highway 23 from the Conoco-Phillips Refinery.

8) Looking east at the Conoco-Phillips Refinery on Highway 23.

9) Looking west at an electrical station across Highway 23 from Conoco-Phillips Refinery.

10) Looking west at an orange grove on Highway 23.



11) Looking east at greenhouses next to an orange grove on Highway 23.

12) Looking east at an orange grove owned by Riley's Citrus on Highway 23.

13) Looking east toward marina with AST from levee where route 2 and 2B meet.

14) Looking northeast from levee where route 2 and 2B meet.

15) Looking northeast along levee from southern section of route 2.

16) Looking south along levee from route 2.

17) Looking southwest at a canal and a field from levee section 2.

18) Looking west at levee along route 2.

19) Looking toward the south-southeast from route 2 at a petroleum well production area.

20) Looking toward the east-southeast from route 2.

21) Looking south at the Wilkinson Canal Pump Station.

22) Looking eastward at three 2000-gallon ASTs located on pump station property.

23) Two engines located on Wilkinson Canal Pump Station property along route 4.

Section 3-
Routes 3, 3A and 3A1

1) Looking south at levee at northwest entrance to section 3.

2) Looking south along levee at northwest entrance to section 3.

3) View of front entrance to Plaquemines Parish Sheriff's Office Training Center/ Campground on Highway 23.

4) View of front entrance to Plaquemines Parish Sheriff's Office Training Center/ Campground.

5) Looking at the Plaquemines Parish Sheriff's Office Training Center/ Campground from the levee to the east.

6) Looking east at International Marine Terminals, located at 18559 Highway 23.

7) Looking east at International Marine Terminals on Highway 23.

8) Looking east at International Marine Terminals on Highway 23.

9) Looking east across Highway 23 from International Marine Terminals, at the existing levee followed by a field.

Section 4-
Routes 4, 4A, 4B and 4C

1) Looking west at Pointe Celeste Therapeutic Riding Center and Deer Farm, located at 21178 Highway 23.

2) Looking west at the adjoining property located north of Pointe Celeste Therapeutic Riding Center and Deer Farm.

3) Pumping station with ASTs located on south-central portion of route 4 levee.

4) Two ASTs across levee from pump station.

5) A former horse corral on property to the south of route 4C.

6) Two ASTs of unknown content on property to the south of route 4C.

7) Looking toward the east-southeast along levee from the eastern side of route 4.

8) Looking toward the northwest of the levee from the eastern side of route 4.

9) Discarded industrial lights and pipes along route 4.

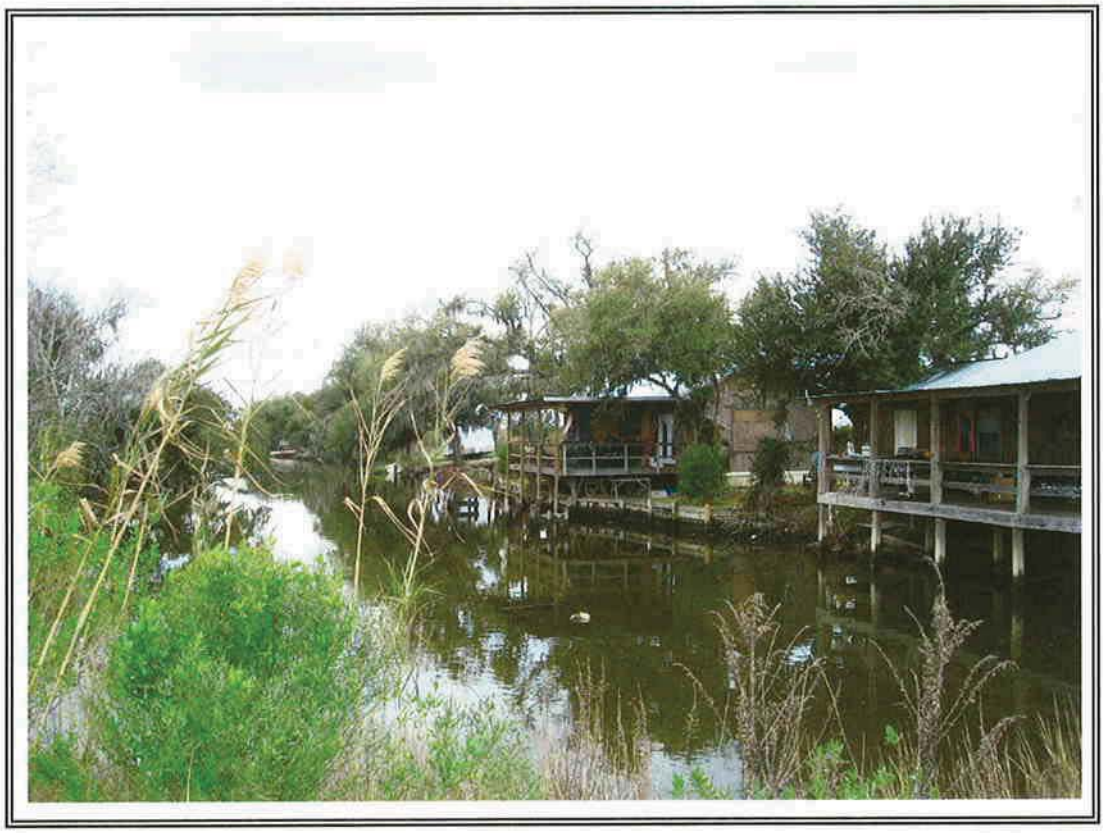
10) Two barge storage containers to the north of the levee along route 4.

11) Looking south from route 4 levee near Lake Hermitage Road.

12) A residence north of route 4 existing levee, near Lake Hermitage Road.

13) A residence northwest of route 4 existing levee, near Lake Hermitage Road.

14) A residence northwest of route 4 existing levee, near Lake Hermitage Road.



15) Residences and camps northwest of route 4 existing levee, near Lake Hermitage Road.

16) Residences northwest of route 4 existing levee, near Lake Hermitage Road.

Section 5-
Routes 5 and 5A

1) Existing non-federal levee west tie-in on Highway 23 near St. Jude.

2) Looking east at existing non-federal levee tie in on Highway 23 near St. Jude.

3) Looking east at existing non-federal levee tie in at the southern end of the site on Highway 23 near St. Jude.

4) Looking west at existing non-federal levee tie-in on Highway 23 at the southern end of the site near St. Jude.

5) Looking west at a diesel tank and abandoned storage shed on Highway 23.

6) Gas pipelines run through marsh and across Highway 23.

7) Gas pipelines run through marsh and across Highway 23.

8) Gas pipelines in front of residential trailers on Highway 23.

9) Looking east at gas pipelines in front of residential trailers on Highway 23.

10) Looking west at an abandoned metal building next to boat yard located at 22952 Highway 23.

11) Looking west at an abandoned metal building on Highway 23.

12) Looking west at an abandoned boat yard on Highway 23.

13) Looking toward the west at an abandoned boat yard on Highway 23.

14) Looking east at a water treatment plant on Highway 23.

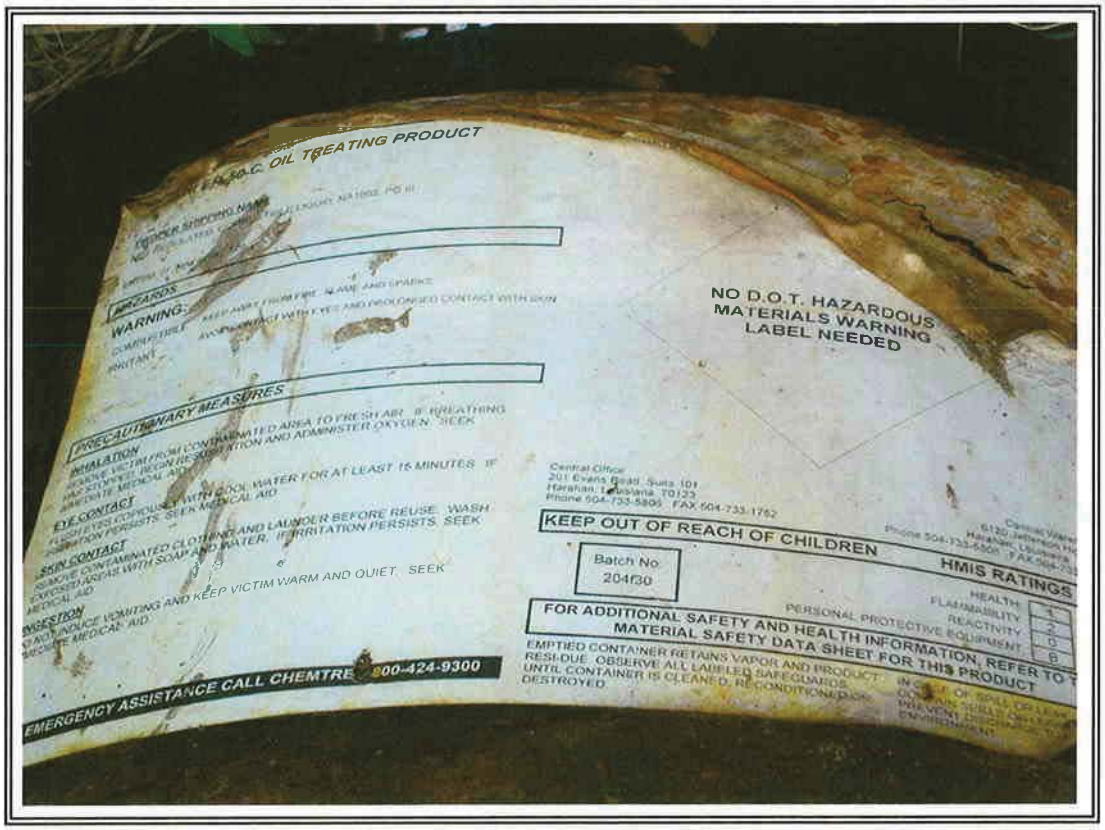
15) Looking east at a water treatment plant on Highway 23.

16) Pump shed containing 2 generators and ASTs along route 5 existing levee.

17) Two ASTs inside pump shed for generator use.

18) A 500 gallon diesel AST next to the pump shed.

19) Four empty 55-gallon black drums labeled non-hazardous material (other 4 drums in back are on boat and are mobile) along route 5 existing levee.



20) Label on empty 55-gallon drum observed along route 5 existing levee.

21) Looking east-southeast at existing levee along eastern boundary of section 5.

22) Looking south at existing levee along eastern boundary of section 5.

23) Looking northeast along the existing levee towards Highway 23.

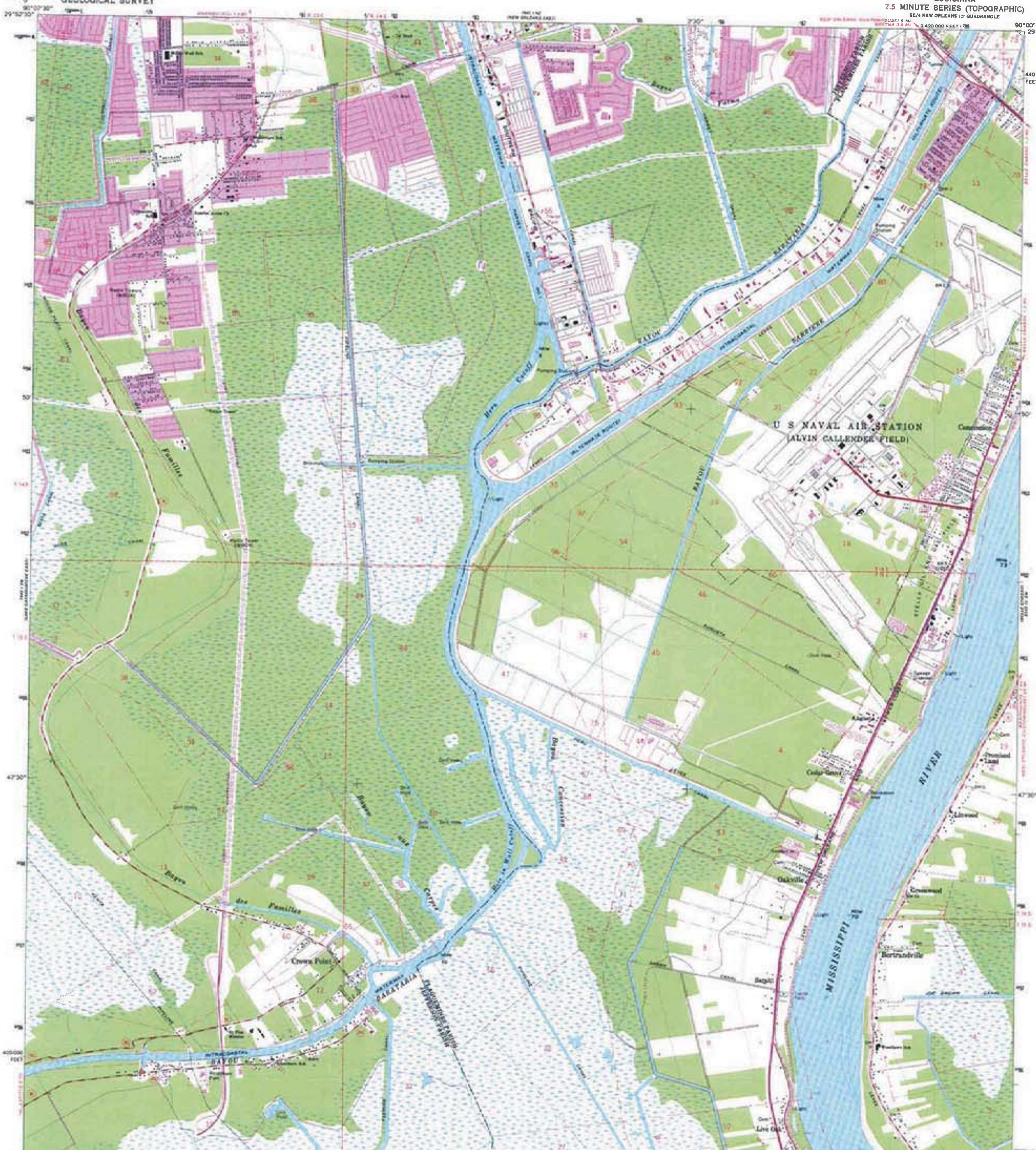
24) Mobile homes located between the existing levee and Highway 23.

APPENDIX E

HISTORICAL REFERENCE DOCUMENTATION

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BERTRANDVILLE QUADRANGLE
LOUISIANA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 NEW ORLEANS 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS

Planimetry by photogrammetric methods from aerial photographs taken 1964. Topography by planetable surveys 1966. Supersedes map dated 1951

Selected hydrographic data compiled from USC & GS Charts 1271 (1966) and 879 (1966). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Louisiana coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue
To place on the predicted North American Datum 1983 move the projection lines 19 meters south and 7 meters east as shown by dashed corner ticks

All or part of this quadrangle lies within a subsidence area
Bench marks have been adjusted to 1964 releveling unless otherwise indicated by parenthetical dates

UTM GRID AND 1979 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET
GULF COAST LOW WATER DATUM
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY ½ FOOT

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND STATE OF LOUISIANA DEPARTMENT OF PUBLIC WORKS, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LOUISIANA
QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled from aerial photographs taken 1972 and 1978. Map edited 1979. This information not field checked
Purple tint indicates extension of urban area

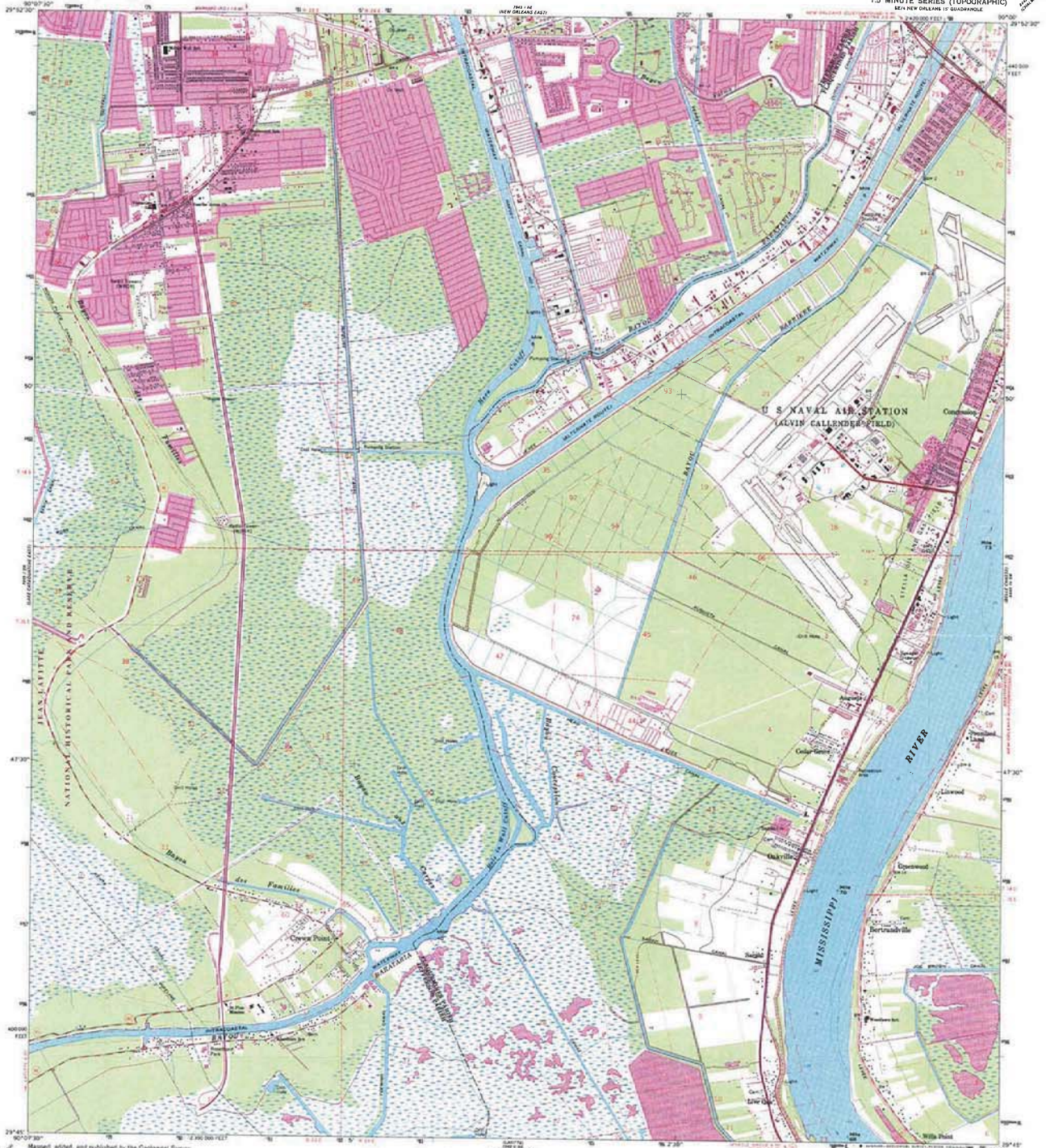
ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved dirt
State Route

BERTRANDVILLE, LA.
SE/4 NEW ORLEANS 15' QUADRANGLE
N2945—W9000/7.5

1966
PHOTOREVISED 1972 AND 1979
DMA 7843 I SE—SERIES V885

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BERTRANDVILLE QUADRANGLE
LOUISIANA
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 NEW ORLEANS 15' QUADRANGLE



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Planimetry by photogrammetric methods from aerial photographs taken 1964. Topography by planetable surveys 1964. Supersedes map dated 1951

Selected hydrographic data compiled from USC & GS Charts 1271 (1966) and 579 (1966). This information is not intended for navigational purposes

Polyconic projection. 1927 North American datum
10,000-foot grid based on Louisiana coordinate system, south zone
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue
To place on the predicted North American Datum 1983
move the projection lines 19 meters south and
7 meters east as shown by dashed corner ticks

All or part of this quadrangle lies within a subsidence area
Bench marks have been adjusted to 1964 releveling unless otherwise indicated by parenthetical dates

TRUE NORTH
MAGNETIC NORTH
7°39'
APPROXIMATE MEAN DECLINATION AT CENTER OF SHEET

There may be private inholdings within the boundaries of the National or State reservations shown on this map

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET – DATUM IS MEAN LOWER LOW WATER

THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY ½ FOOT

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND LOUISIANA DEPARTMENT OF PUBLIC WORKS, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LOUISIANA
QUADRANGLE LOCATION

Revisions shown in purple compiled from aerial photographs taken 1972, 1978 and 1988 and other sources. This information not field checked. Map edited 1989

Purple tint indicates extension of urban area

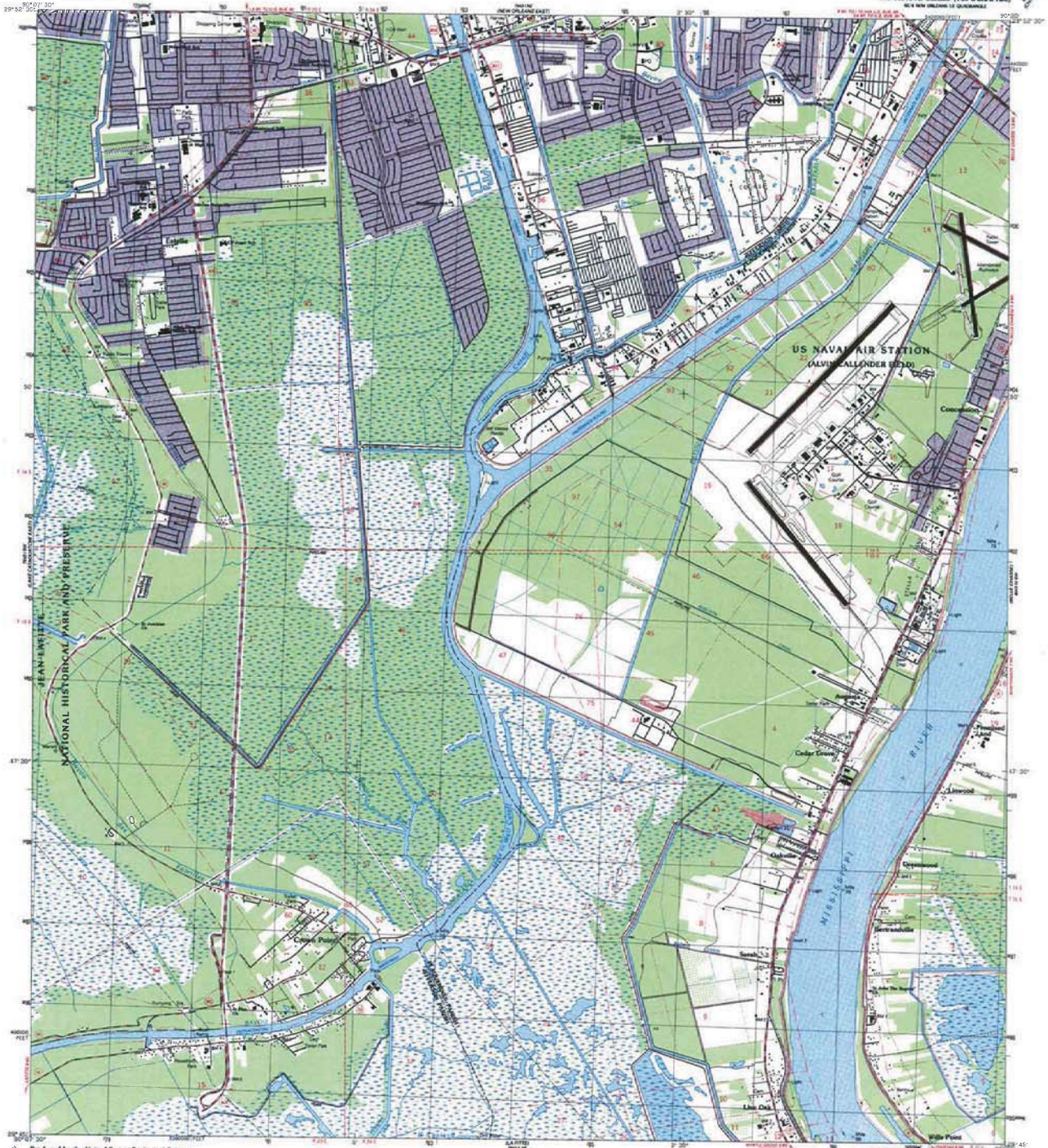
ROAD CLASSIFICATION
Heavy duty — Light duty
Medium duty — Unimproved dirt
State Route

BERTRANDVILLE, LA.
SE/4 NEW ORLEANS 15' QUADRANGLE
29090-D1-TF-024

1968
PHOTOREVISED 1989
DMA 7941 I SE SERIES V882

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BERTRANDVILLE QUADRANGLE
LOUISIANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Produced by the United States Geological Survey
in cooperation with State of Louisiana agencies
Control by USGS, NOS/NOAA and Louisiana Highway Department
Topography by photogrammetric methods from aerial photographs taken 1984 and planimetric surveys 1986. Revised from aerial photographs taken 1989. Field checked 1991. Map edited 1992
Projection and 10,000-foot grid ticks: Louisiana coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15
1927 North American Datum
The difference between 1927 North American Datum and North American Datum of 1983 (NAD 83) for 7.5-minute intersections is given in USGS Bulletin 1851. The NAD 83 is shown by dashed corner ticks
There may be private inholdings within the boundaries of the National or State reservations shown on this map
Gray tint indicates areas in which only landmark buildings are shown
All or part of this quadrangle lies within a subsidence area

TRUE NORTH
MAGNETIC NORTH
7°30'
15 MILS
NATIONAL GRID AND TRUE NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

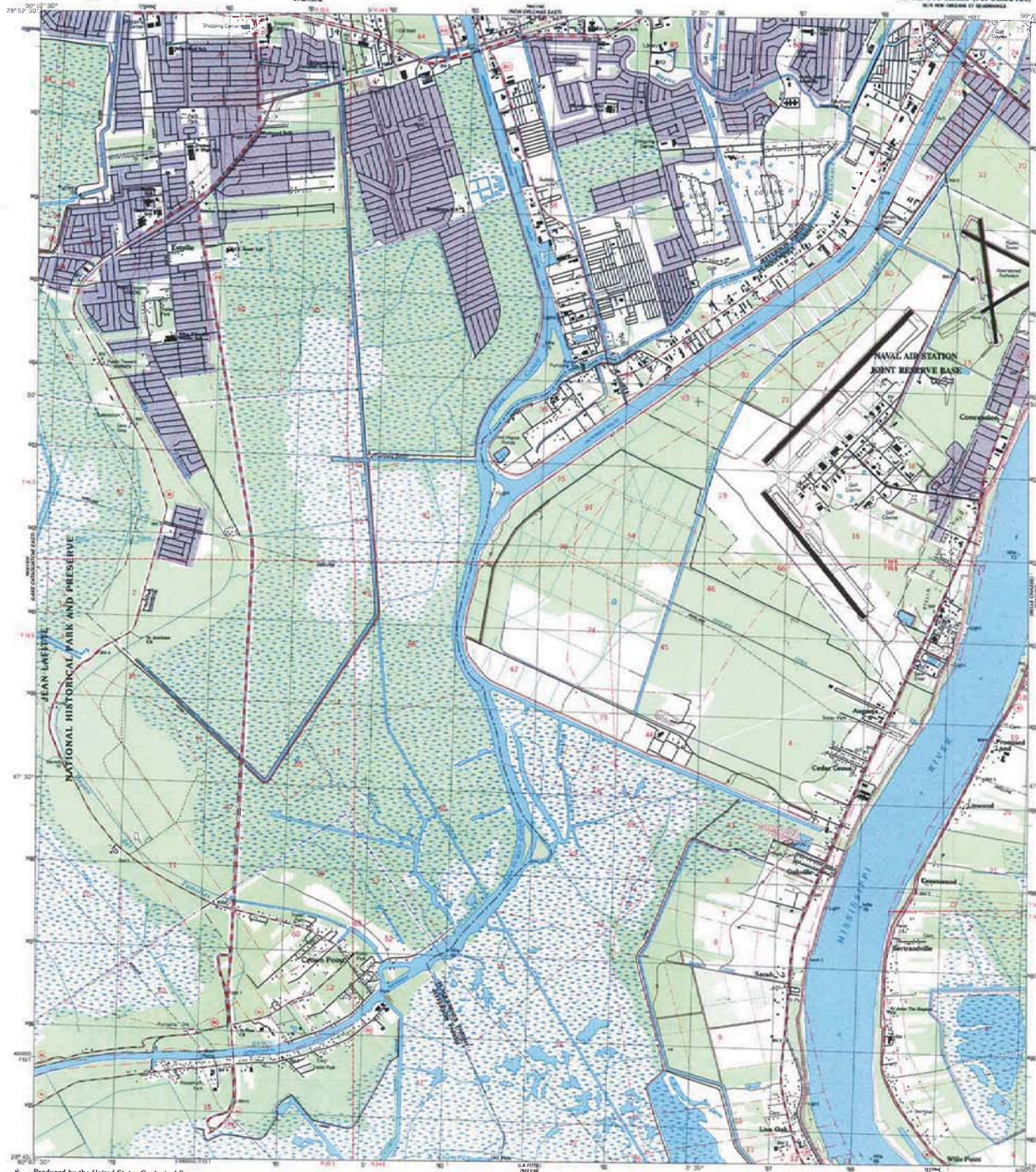
LOUISIANA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

BERTRANDVILLE, LA.
SE/4 NEW ORLEANS 15' QUADRANGLE
29090-G1-TF-024
1992
DMA 7943 I SE-SERIES V895

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

BERTRANDVILLE QUADRANGLE
LOUISIANA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Produced by the United States Geological Survey

Derived from imagery taken 1989 and other sources. Photoinspected using imagery taken 1995; no major culture or drainage changes observed. PLSS and survey control current as of 1995
Boundaries verified 1999

North American Datum of 1927 (NAD 27). Projection and 10 000-foot ticks: Louisiana coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

All or part of this quadrangle lies within a subsidence area

There may be private inholdings within the boundaries of the National or State reservations shown on this map

UTM GRID AND 1995 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

KILOMETERS
METERS
MILES
FEET

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
AND LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

BERTRANDVILLE, LA.

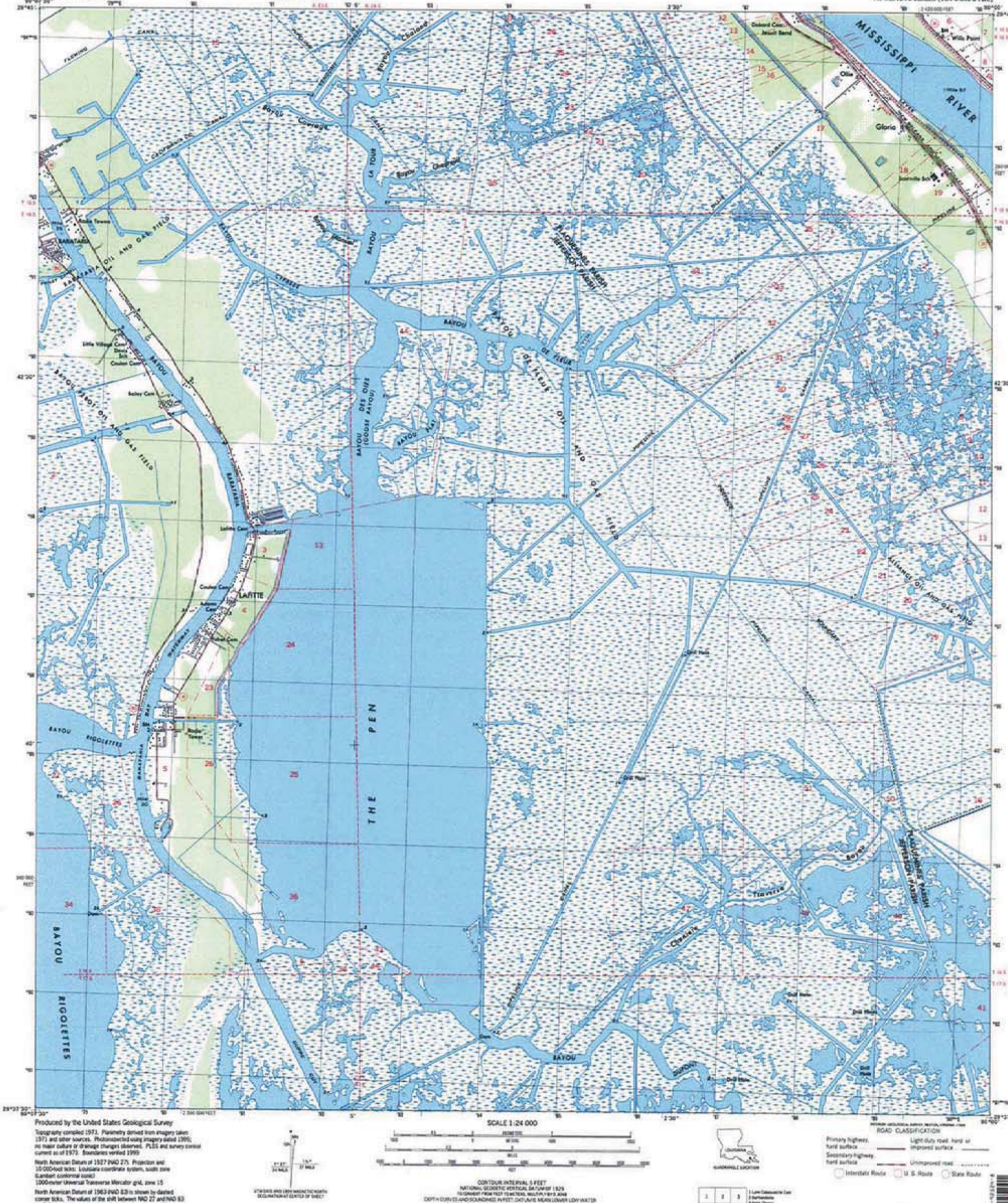
1995

NIMA 7943 I SE-SERIES V885

ISBN 0-607-92602-7

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

LAFITTE QUADRANGLE
LOUISIANA
7.5-MINUTE SERIES (TOPOGRAPHIC)



Produced by the United States Geological Survey

Topography compiled 1971. Planimetry derived from imagery taken 1971 and other sources. Photoinspected using imagery dated 1995; no major culture or drainage changes observed. PLSS and survey control current as of 1971. Boundaries verified 1999

North American Datum of 1927 (NAD 27). Projection and 10 000-foot ticks: Louisiana coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15

North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET. DATUM IS MEAN LOWER LOW WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY .5 FOOT
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
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AND LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, BATON ROUGE, LOUISIANA 70804
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QUADRANGLE LOCATION

ADJOINING 7.5' QUADRANGLE NAMES

LA-2308

ROAD CLASSIFICATION

Primary highway, hard surface
Light duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U. S. Route
State Route

LAFITTE, LA
1995

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PHOENIX QUADRANGLE
LOUISIANA - PLAQUEMINES PARISH
7.5 MINUTE SERIES ORTHOPHOTOMAP (TOPOGRAPHIC)
NW/4 POINTE A LA HACHE 15' QUADRANGLE

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Orthophotomap prepared from high altitude aerial photographs taken Oct. 11, 1941. Topography by planetable surveys 1973

Selected hydrographic data compiled from USC&GS Chart 1271 (1972)

This information is not intended for navigational purposes

Projection and 10,000 foot grid ticks: Louisiana coordinate system, south zone (Lambert conformal conic)

1000-meter Universal Transverse Mercator grid ticks, zone 16, shown in blue

Blank area in this quadrangle lies within a subdivision area where detailed land lines have not been established or are not shown because of insufficient data

UTM GRID AND 1983 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

To place on the projected North American Datum 1983 move the projection lines 20 meters south and 7 meters east as shown by dashed corner ticks

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND BY THE STATE OF LOUISIANA DEPARTMENT OF PUBLIC WORKS, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LOUISIANA
QUADRANGLE LOCATION

ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

PHOENIX, LA.
NW/4 POINTE A LA HACHE 15' QUADRANGLE
29089-F8-OM-024

1973

DMA 6043 III NW—SERIES V9650

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LAKE LAURIER QUADRANGLE
LOUISIANA
7.5 MINUTE SERIES ORTHOPHOTOMAP (TOPOGRAPHIC)

Produced by the United States Geological Survey
Control by USGS and NOS/NOAA
Orthophotomap prepared from high-altitude aerial photographs
taken Oct. 11, 1971. Topography by stereoplotter surveys 1972
Selected hydrographic data compiled from USC&GS Chart 1271 (1952)
This information is not intended for navigational purposes
Projection and 10,000-foot grid ticks: Louisiana coordinate
system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid ticks,
zone 16, shown in blue. 1927 North American datum
The difference between 1927 North American Datum and North American
Datum of 1983 (NAD 83) for 7.5-minute intersections is given in USGS
Bulletin 1876. The NAD 83 is shown by dashed corner ticks
All or part of this quadrangle lies within a subsidence area
Where omitted, land lines have not been established or
are not shown because of insufficient data

TRUE NORTH
MAGNETIC NORTH
1°27'
1983
DECLINATION AT CENTER OF SHEET

Photoinspected from 1989 source; no major culture or drainage
changes observed. Boundaries and names verified 1992

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1 FOOT

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

LOUISIANA
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING 7.5' QUADRANGLE NAMES

ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

LAKE LAURIER, LA.
SW/4 POINTE A LA HACHE 10' QUADRANGLE
29089-E8.0M-024

1973
MINOR REVISION 1992
DMA 8043 III SW-SERIES V8950

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

POINTE A LA HACHE QUADRANGLE

LOUISIANA–PLAQUEMINES PARISH
7.5 MINUTE SERIES ORTHOPHOTOMAP (TOPOGRAPHIC)

Produced by the United States Geological Survey
Control by USGS and NOS/NOAA
Orthophotomap prepared from high-altitude aerial photographs taken Oct 24 1971 Topography by planetable surveys 1973
Selected hydrographic data compiled from USC&GS Chart 1271(1972)
This information is not intended for navigational purposes
Projection and 10,000 foot grid ticks Louisiana coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid ticks zone 16 shown in blue 1927 North American datum
The difference between 1927 North American Datum and North American Datum of 1983 (NAD 83) for 7.5-minute intersections is given in USGS Bulletin 1875 The NAD 83 is shown by dashed corner ticks
All or part of this quadrangle lies within a subsidence area
Where omitted, land lines have not been established or are not shown because of insufficient data

UTM GRID AND 1992 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Photoinspected from 1989 source; no major culture or drainage changes observed. Boundaries, other than corporate, and names revised 1992

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY ½ FOOT

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, BATON ROUGE, LOUISIANA 70804
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ADJOINING 7.5' QUADRANGLE NAMES

ROAD CLASSIFICATION

Primary highway, hard surface
Light duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U. S. Route
State Route

POINTE A LA HACHE, LA.
SE/4 POINTE A LA HACHE 15' QUADRANGLE
29089-E7-OM-024

1973
MINOR REVISION 1992
DMA 8043 III SE–SERIES V8850

APPENDIX F

INTERVIEW DOCUMENTATION

LIST OF CONTACTS INTERVIEWED
PHASE I ENVIRONMENTAL SITE ASSESSMENT

Name	Title	Affiliation	Topics Discussed
Ms. Zina Thomas	Employee	International Marine Terminals	USTs and monitoring wells on site
Mr. Rocky Buras	Employee	Citrus Lands	USTs and remediation on site

APPENDIX G

REFERENCES

REFERENCES

Interviews: N/A

The First Search Report, FTC, August 24, 2007.

USGS Topographic Map of "Belle Chasse, Louisiana," dated 1994.

US Department of Agriculture Soil Conservation Service, *Soil Survey of Plaquemines Parish*, dated 1987.

Websites:
LDEQ http://edms.deq.louisiana.gov/app/doc/querydef.aspx
USGS http://la.water.usgs.gov/default.html
LDNR http://sonris-www.dnr.state.la.us/www_root/sonris_portal_1.htm

APPENDIX H

QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

K. Dawn Blackledge, P.G.

AEROSTAR ENVIRONMENTAL SERVICES, INC.

Years with Current Firm
14 Years

Total Years Experience
23 Years

Employee Title
Program Manager

Office
Jacksonville, FL

Academic Background
B.S., Geological Engineering, University of Mississippi, 1982

Professional Training
Florida, Professional Geologist No. 556
Alabama, Professional Geologist No. 956

Professional Affiliations
Governor's Appointee, Board of Professional Geologist

Florida Engineering Society

Society of Women Engineers

American Water Resources Association

Society of American Military Engineers

Florida Association of Professional Geologists

Program Manager

As founder and president of AEROSTAR, Dawn has 23 years of experience as an environmental engineer and hydrogeologist. She has served as Program Manager for many of AEROSTAR's DoD IDIQ contracts, EBS/ESA IDIQ contracts for state and private clients, and IRP-related contracts for federal, state, and private contracts. Ms. Blackledge has a strong technical and managerial background, and has performed projects related to compliance audits; environmental planning and conservation; hazardous materials and hazardous waste/hazardous materials investigations and minimization studies; range assessments and cleanups; hydrocarbon site assessments; stormwater, water and wastewater sampling and quantification of pollutants; and other site assessment and remediation services for a wide range of commercial and industrial facilities. She is also responsible for maintaining and developing cost controls and compliance with project schedules while simultaneously managing more than 50 staff. She has a strong relationship with the USACE Savannah, Mobile and New Orleans Districts. She is a member of SAME and serves as the Chair of the Relationships and Reorganization Committee. She has published several articles on NPDES permitting requirements and environmental site assessments.

Project Experience

Ms. Blackledge's project experience includes:

- **US Corps of Engineers, Savannah District IDIQ Contract for Base Environmental Support Services, (Various Facilities throughout Southeast US) – Program Manager**: Ms. Blackledge has directed a variety of environmentally related projects as part of this ongoing task order contract. Projects have included **NEPA documentation; Installation Restoration Program** designs, surveys, studies, and long term operations and monitoring; natural, cultural, and historical resource surveys; and hazardous waste/material minimization studies at numerous installations. Ms. Blackledge is responsible for allocating resources and manpower, budgeting, scheduling, and quality assurance/quality control for project deliverables. Projects have been performed in **North Carolina, Alabama, Kentucky,** and various other states. The majority of the task orders assigned under this contract are FFP. All work performed under this contract has been on time and on budget. Project Value: $6,000,000.
- **US Army Corps of Engineers, Mobile District Base Environmental & Sustainment Contract (BEST) (Various Facilities CONUS) – Program Manager**: Ms. Blackledge has directed various professional and construction related services pertaining to the Base Environmental and Sustainment Support (BEST) for customers of the District. The environmental and base support services consist of the full range of services including environmental restoration, environmental conservation, **environmental compliance,** pollution prevention, **safety and industrial hygiene**, and base SRM support CONUS wide. Approximate project revenue: $3,000,000.
- **US Army Corps of Engineers, New Orleans District Environmental Support Performance-Based Contract, (Various Facilities USACE New Orleans AOR) – Program Manager** & Principal-in-Charge: Ms. Blackledge is directing various environmental service related projects being performed as part of the levee reconstruction program. Projects include Phase I and II ESAs; dredge material **sampling** and classification for disposal; EISs; modified EAs (IERs); and debris disposal management. Approximate Contract Revenue: $150,000.
- **FDEP Petroleum Cleanup Program – Title I and Title II A-E Services (Multiple Sites throughout Florida) – Program Manager** for a $12 million state petroleum cleanup contract. Ms. Blackledge is responsible for program management activities associated with performing **site investigations,** preparing contamination assessment reports and remedial action plans, and constructing and operating soil and groundwater cleanup systems. This includes all Title I and II environmental related services.

Paul Fitch, P.E.

AEROSTAR ENVIRONMENTAL SERVICES, INC.

Years with Current Firm
9 Years

Total Years Experience
15 Years

Employee Title
Environmental Engineer

Office
Jacksonville, FL

Academic Background
Bachelor of Science Degree in Electrical Engineering University of Central Florida, 1992

Professional Training
Florida PE, No. 57447; Florida LAC No. AX64; Alabama PE, No. 25490; Georgia PE, No. 029107; Mississippi PE, No. 17340; Louisiana PE, No. 33197; N. Carolina PE, No. 34671; S. Carolina PE, No. 26699

Environmental Engineer

Mr. Fitch has over 15 years of experience providing Title I and II A-E services for environmental projects, including DoD clients. Mr. Fitch brings a wealth of knowledge in compliance with environmental regulations and preparation of Physical Condition Assessments and EBS documents. He has performed over 500 ESA/EBS projects over the past 15 years for private, state and federal clients. He has also prepared Spill Prevention Control and Countermeasure (SPCC) Plans, Storm Water Pollution Prevention Plans (SWPPP) and Baseline Environmental Assessments for various federal facilities including Camp Blanding National Guard Training Facility, Air Force Avon Park Bombing Range, Naval Air Station Jacksonville, Langley Air Force Base, and Newport Naval Base. Assessment and audit experience includes compliance audits for the Fernandina Beach Municipal Airport, the Jacksonville Transportation Authority, local commercial businesses, and several apartment complexes.

Project Experience

Mr. Fitch's project experience includes:

- **Avon Park Bombing Range Environmental Baseline Survey, (Avon Park, FL) – Environmental Engineer**. Conducted EBS of Avon Park Bombing Range and Unit Equipment Training Site. Total acreage of project was approximately 56 acres, including 2 live fire ranges. Project included reviews of historical files, aerial photos and site surveys, review of hazardous waste management practices, and preparation of Best Management Practices plans.
- **Jacksonville Transportation Authority - Comprehensive Environmental Consulting Services (Jacksonville, Florida) – Environmental Engineer**. Performed environmental compliance, site engineering, consulting with regulatory officials, quality assurance, assessment, oversight and implementation for multiple projects at JTA owned/operated facilities. Updated facility SPCC Plan, Storm Water Pollution Prevention Plan (SWPPP) and underground storage tank/aboveground storage tank (UST/AST) compliance documentation for multiple JTA facilities. Prepared structural, electrical, lightning, and fire protection design for $1.5 million AST upgrade project.
- **USCG Miscellaneous Environmental Services (Various Facilities) – Environmental Engineer**. Performed site surveys and assessments, consulted with regulatory officials, and prepared final reports for multiple environmental design projects. This included preparing storm water pollution prevention plan updates, spill plan updates, hydrological surveys, and HTRW - LBP surveys. These projects involved, use of GIS and CADD tools, and ground and aerial surveys.
- **Jacksonville Electric Authority – SPCC Preparation for 120 JEA Substations, Power Plants and Service Centers – Environmental Engineer.** Performed site surveys and assessments, consulted with regulatory officials, and prepared final reports for 120 JEA facilities. Project included comprehensive survey of equipment type, capacity, location and equipment status. Project reports included recommendations concerning lighting and security upgrades.
- **Submarine Naval Base Kings Bay – Environmental Engineer.** Performed comprehensive evaluation of base water systems including flow rates, treatment methodologies, metering and conservation. Project reports were submitted to the State for inclusion in the base's water withdrawal permit.

APPENDIX J
PROPOSED MITIGATION PLAN

APPENDIX J
PROPOSED MITIGATION PLAN

PROJECT DESCRIPTION

1. The New Orleans to Venice (NOV) Hurricane Protection project is 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 Oakdale community and terminating at the St. Jude community. The average grade elevation of the existing non-Federal levee (NFL) varies from approximately 8 feet on the northern end to approximately 3 feet in some reaches on the southern end.

2. The goal of this project is to provide improved 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 modifying or replacing the flood risk management capability of the 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 alternatives, which represent the least environmentally damaging alternative to accomplish the needed risk reduction system modification or replacement, would modify or replace and incorporate 32 miles of existing non-Federal back levees on the west bank of the Mississippi River in the Plaquemines Parish Federal levee system and construct from ground level 2 miles of earthen back levees.

3. During the alternative analysis, there were three separate construction alternatives developed that all follow the existing NFL alignment with differences in width and length. Table J-1 displays a brief description of the four alternatives considered, including the No-Action alternative. A more detailed description of the alternatives can be found in Section 4 of this EIS.

TABLE J-1
DESCRIPTION OF ALTERNATIVES

Alternatives	Description
A (No Action)	The No-Action Alternative would do nothing to replace or modify the NFL for the purpose of providing improved storm surge protection and protect evacuation routes.
B (Proposed Action)	Alternative B would replace or modify the existing levee sections to the designed height of 2 percent level of risk reduction (LORR) and incorporate Sections 1-5 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.
B2 (NFS Alignment Option)	Alternative B2 would replace or 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 2-5, with the levee grades being higher in Section 1 to reflect the non-Federal sponsor's alignment option. Sections 2-5 of Alternative B2 would be identical to Sections 2-5 of Alternative B.
C (Mississippi River Levee (MRL) Tie-In)	Alternative C would replace or modify the existing levee sections to the designed height of 2 percent LORR and incorporate Sections 1-3 of the non-Federal levees 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 that additional funding was appropriated to complete the project, Sections 4 and 5 would then later be incorporated into the Federal hurricane and storm risk reduction system utilizing the same alignment as Alternatives B and B2.

4. For purposes of this study, we are carrying forward each alternative and the estimated borrow for consideration in addition to Alternative B (Proposed Action). The rationale for this path is to fully document each alternative's impact since the possibility of constructing Alternative B2 or C is still probable. Full disclosure of the impacts will be needed to provide compensatory mitigation.

5. Alternative B2 is the NFS Alignment Option and will be constructed if the required funding is provided by the non-Federal sponsor to build Section 1 above the authorized grade of Alternative B.

6. Alternative C is a tie-in to the existing MRL and was developed to provide a fully functional Federal levee system connecting just south of Citrus Lands if funding for Alternative B was exhausted before project completion

7. On 10 April 2008, the U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency issued regulations governing compensatory mitigation for activities authorized by Department of the Army permits (Federal Register, Vol. 73, No. 70). According to the Federal Register, those regulations establish performance standards and criteria for the use of permittee responsible compensatory mitigation, mitigation banks, and in-lieu programs to improve the quality and success of compensatory mitigation projects. The following summary outline generally describes the process of developing a mitigation plan as outlined in those regulations (see the Federal Register for a detailed description of each step).

8. Objectives. A description of the resource type(s) and amount(s) that would be provided as mitigation, the method of compensation, and the manner in which the resource functions of the compensatory mitigation project would address the needs of the geographic area of interest.

a. Site Selection. A description of the factors considered during the site selection process.

b. Baseline Information. A description of the ecological characteristics of the proposed compensatory mitigation project site.

c. Determination of Credits. A description of the number of credits to be provided, including a rationale for that determination.

d. Mitigation Work Plan. Detailed written specifications and work descriptions for the compensatory mitigation project.

e. Maintenance Plan. A description and schedule of maintenance requirements to ensure the continued viability of the resource once initial construction is completed.

f. Performance Standards. Ecologically based standards that will be used to determine whether the compensatory mitigation project is achieving its objective.

g. Monitoring Requirements. A description of parameters to be monitored in order to determine if the mitigation project is on track for achieving its performance standards and if adaptive management is needed.

h. Long-term Management Plan. A description of the manner in which the compensatory mitigation project will be managed after the performance standards have been achieved to ensure the long-term sustainability of the resource.

i. Adaptive Management Plan. A management strategy to address unforeseen changes in site conditions or other mitigation project components.

j. Financial Assurances. A description of the financial assurances that would be provided and how they are sufficient to ensure a high level of confidence that the mitigation project will be successfully completed in accordance with its performance standards.

Proposed Compensatory Mitigation Plan

Objectives

9. The goals and objectives are to fully offset the impacts to habitats located in the Plaquemines Parish area related to the construction of the NFL replacement or modification and attempt to document the intent of the U.S. Army Corps of Engineers to follow the Council on Environmental Quality's National Environmental Policy Act guidelines (i.e., avoid, minimize, rectify, reduce, or eliminate the impact and compensate for unavoidable impacts).

Site Selection

10. Site selection will be based on the available topography to establish the impacted habitat types. As outlined in Table J-2, there are eight separate habitat types located in the NFL project areas. For purposes of this study, certain habitat type's impacted acres will be combined and mitigated with the more critical habitat in the area.

11. The impacted acres of bottom-land hardwoods wet and dry, scrub-shrub, and swamp will be combined and mitigated following standardized bottom-land hardwoods reforestation technique, including species and topography criteria, to meet swamp restoration goals as outlined in the Draft Fish and Wildlife Coordination Act (DFWCA) report (Appendix B).

12. Marsh is the most critical habitat within the project area, and site selections are based on topography and salinity levels within the water. Since wet pasture is so closely related to freshwater marsh habitat, its habitat impacts will be mitigated with freshwater marsh restoration. The remaining marsh habitat, brackish, will be mitigated for individually. Marsh restoration will follow the provided guidelines as outlined in DFWCA (Appendix B) and recommendations from the multiagency team.

13. The site selection process for all habitat types will follow standard Civil Works procedures if mitigation is achieved via land acquisition. Lands will be acquired from sellers in accordance with appropriate legal acquisition processes, and location priority will consider standard U.S. Army Corps of Engineers, Vicksburg District, criteria within the project area, within watershed or within basin. In addition, hydrological conditions, soil characteristics, and other physical and chemical characteristic variables will be considered in each habitat restoration area.

Mitigation Bank

14. In addition, following guidelines established in the Water Resource Development Act 2007 Section 2036(a), in carrying out a water resources project that involves wetlands mitigation and has impacts that occur within the service area of a mitigation bank, the Corps, where appropriate, will consider the use of the mitigation bank if the bank contains sufficient available credits to offset the impact and the bank is approved in accordance with the Federal Guidance for the Establishment, Use, and Operation of Mitigation Banks.

TABLE J-2
IMPACTS TO THE NATURAL ENVIRONMENT

Habitats	Alternative B			Alternative B2			Alternative C			Borrow		
	Impacted Acres	AAHUs	Mitigated Acres	Impacted Acres	AAHUs	Mitigated Acres	Impacted Acres	AAHUs	Mitigated Acres	Impacted Acres	AAHUs	Mitigated Acres
Bottom-land Hardwoods Wet	124.6	85.8	158.9	146.0	100.9	186.9	27.3	19.2	35.6	0.0	0.0	0.0
Bottom-land Hardwoods Dry	17.7	12.1	22.4	20.4	13.8	25.6	9.0	5.7	10.6	1658.9	608.8	1127.5
Wet Pasture	146.9	50.6	67.5	146.9	50.6	67.5	73.6	25.7	34.3	0.0	0.0	0.0
Swamp	24.9	21.1	44.0	67.6	57.4	119.6	24.9	21.1	44.0	0.0	0.0	0.0
Scrub-Shrub	1.4	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intermediate Marsh	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Freshwater Marsh	10.4	6.8	25.2	27.2	17.8	65.9	10.4	6.8	25.2	0.0	0.0	0.0
Brackish Marsh	16.1	8.9	33.0	16.1	8.9	33.0	9.0	5.3	19.6	0.0	0.0	0.0
TOTAL ALL HABITATS	342.0	185.0	351.0	426.0	249.0	498.0	154.0	84.0	169.0	1,658.9	608.8	1,127.5

Site Protection Instrument

15. The sites selected for bottom-land hardwoods or marsh restoration will be purchased fee titled by the Corps, and management will be transferred to the sponsor or a Federal, tribal, state, or local resource agency or a nonprofit conservation organization. A Memorandum of Agreement (MOA) between the Corps and agency or the Project Partnership Agreement with the sponsor will outline annual appropriations and management responsibilities for the properties to sustain the restoration goals outlined in this document.

Baseline Conditions

16. Project Site. During the environmental analysis of the project area, eight different habitats were identified, and the impacts to these habitats were documented during the Wetland Value Assessment (WVA) that was coordinated with the U.S. Fish and Wildlife Service; National Marine Fisheries Service (NMFS); and Louisiana Department of Wildlife, Fisheries and Parks. Table J-2 displays the impacted habitat acres, resulting average annual habitat unit (AAHU) loss by alternative, and the required mitigation acres to compensate the losses.

17. Proposed Mitigation Sites. As mentioned previously, priority will be placed on areas within the project area adjacent to flood side and protected side impacts. Included in DFWCA are priority areas the Corps will be focusing on to implement restoration alternatives, although all recommended opportunities will be investigated to ensure the best sites are selected that fully mitigate impacts.

Determination of Credits

18. Credits established in Civil Works projects are AAHUs that are a product of the WVA. Each AAHU represents the quality and quantity of the habitat at a given point in time. The AAHUs are calculated using the acres of impacted habitat multiplied by the Habitat Suitability Index to produce habitat units (HU). The HU is then averaged over the project life to determine AAHU loss. Through multiagency coordination, a mitigation acres HU value for each acre restored was established for each habitat. This value was divided by the lost AAHUs to compute the total mitigation acres needed to fully offset the impacts from construction.

Mitigation Work Plan

19. Once the mitigation sites are selected, a mitigation working plan will be developed based on agency recommendations as outlined in Appendix B.

Maintenance Plan

20. Once the mitigation sites are selected, a maintenance plan will be developed based on agency recommendations as outline in Appendix B. Maintenance of the proposed mitigation sites will be the responsibility of the non-Federal sponsor.

Performance Standards

21. Performance standards for each habitat type have been included in Appendix B. Once a site has been selected, the performance standards will be reevaluated to reflect the best interest of the specific location and mitigation technique. If a certified compensatory mitigation bank is selected, the performance standards outlined in that agreement will be used.

Monitoring Requirements

22. Once the mitigation sites are selected, a monitoring plan will be developed based on agency recommendations as outlined in Appendix B. Monitoring of the proposed mitigation sites will be the responsibility of the non-Federal sponsor.

Long-Term Management Plan

23. Once the mitigation site has been selected and successfully restored, the MOA with the managing agency or the OMRR&R manual with the sponsor will outline the long-term management requirements.

Adaptive Management Plan

24. If site conditions are unsuccessful or successful criteria has not been met due to unavoidable or natural disaster, the Corps and cooperating agencies will reassess the project location and determine if alternative methods are necessary to meet successful criteria.

Financial Assurances

25. At the time of this project, funding for mitigation is in place and appropriated for use for mitigation activities. The goal of the mitigation program is to remain concurrent with construction. Construction of the NFL system will be phased beginning at Section 1 and moving southward as funding allows. For the mitigation to remain concurrent with construction, the funding for mitigation site acquisition, development, and construction has been budgeted in two phases to attempt to correlate with the proposed NFL construction timeline. Phase 1 of the mitigation budgets correlates with constructing Sections 1 and 2 of the NFL system, and Phase 2 of the mitigation budgets correlates with constructing Sections 3-5. Table J-3 outlines the budgeted amounts for each alternative by phase.

TABLE J-3
BUDGETED MITIGATION FUNDS BY ALTERNATIVE

Alternative	Phase 1 ($)	Phase 2 ($)
A		
B	3,313,108.18	4,181,322.57
B2	7,690,880.49	4,181,322.57
C	9,946,232.39	a/

a/ Alternative C Phases 1 and 2 were combined.